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# EVANSIA

Volume 13 Number 1

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ISSN 0747-9859

*Evansia* volume 12, number 4 was mailed on 4 December 1995

# The Ephemeraceae (Musci) in Maine

Ronald A. Pursell[1] and Bruce Allen[2]

The Ephemeraceae are a family of reduced, minute, and, as their name reflects, ephemeral mosses that form sparse to abundant protonemata. Commonly called pygmy mosses (others also in this category are *Aphanorrhegma, Archidium, Phascum,* and *Physcomitrella*), these plants are pioneers on bare, often disturbed, soil, and should be looked for in such places as fallow fields, low areas in woods, and along the margins of small pools, ponds, lakes, and streams. Plants of this family have extremely short stems (no more that 2 mm long, usually shorter) and few leaves. The upper leaves are primarily lanceolate and acuminate with more or less rhomboidal cells that are either smooth or scindulose. Leaf margins vary from entire to spinose. Sporophytes consist of sessile or nearly sessile, gymnostomous capsules that are either cleistocarpous or stegocarpous by means of a median or near-median line of weak-walled cells. Stomata may be absent or present, with their distribution varying according to species. Spores are large, reniform, and papillose to tuberculate. Calyptrae are small and mitrate, or consist of only the remnants of archegonia.

Spores germinate and the protonemata begin to grow in late summer. The formation of leafy gametophores and sporophytes, with maturation of spores, occurs in September, October, and early November. Sometimes, however, spore maturation can be delayed until the following spring, and at times the plants overwinter in the protonemal stage. The paucity of collections of these mosses reported herein is probably the result of their being overlooked because of their small size rather than their rarity. Bryan & Anderson (1957) have studied the American species in detail, and an excellent account of the family in eastern North America is found in Crum & Anderson (1981). The family includes two genera, *Ephemerum* and *Micromitrium*, both are found in Maine.

## Key to the Genera

1. Protonemata abundant, sometimes almost felt-like; plants dioicous or rhizautoicous; capsules apiculate, indehiscent; calyptrae 0.2 or more long, firm, mitrate, deciduous . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1. *Ephemerum.*
1. Protonemata sparse to moderately abundant; plants synoicous; capsules rounded apically, dehiscent; calyptrae less than 0.2 mm long, delicate, consisting of little more than archegonial remains, persistent . . . . . . . . . . . . . . . 2. *Micromitrium.*

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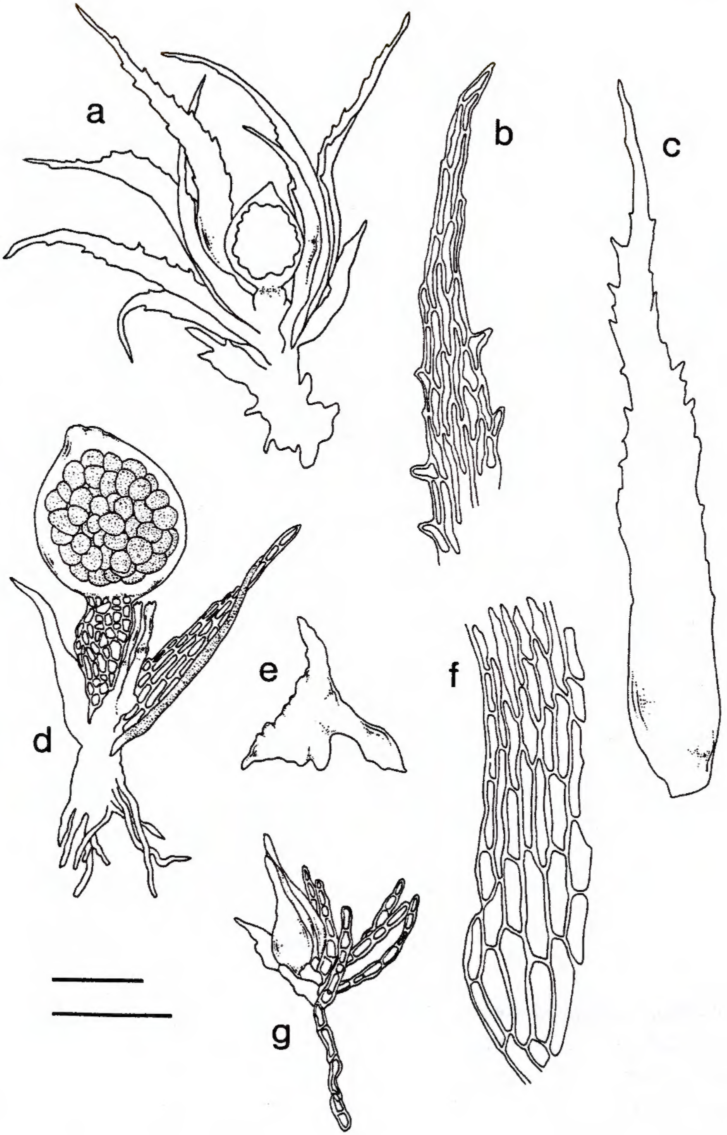

Figure 1. **Ephemerum serratum**. a. Habit. b. Leaf apex. c. Leaf. d. Sporophyte with spores, two archegonia, and lower part of stem. e. Calyptra. f. Lower leaf cells and alar cells. g. Perigonium with protonemal filaments. Scales in mm: Top = 0.1 (b,e,f); top = 0.02 (c,d,g); bottom = 0.5 (a).

**Ephemerum** Hampe, Flora 20: 285. 1837, *nom. cons.*

Plants scattered to gregarious on abundant protonemata. Leaves little crispate when dry; costae well-developed to ± lacking; laminal cells firm-walled, oblong-rhomboidal to oblong hexagonal, smooth or scindulose. Dioicous or rhizautoicous. Capsules apiculate, indehiscent, stomatose, stomata distributed throughout the exothecium or restricted to the proximal ½ or less of the exothecium. Calyptrae mitrate, smooth or scindulose.

The protonemata are much more abundant and velvety in appearance in *Ephemerum* than they are in *Micromitrium*, and often cover large expanses of bare soil. Moreover, the mature protonemata of *Ephemerum* are complex structures, consisting of two distinct parts. There is a prostrate part of irregularly branched, brownish filaments with oblique cross-walls and few chloroplasts. This part corresponds to the caulonema as defined by Sironval (1947) and Bopp (1950, 1983), and Nehira (1983). We have observed leafy gametophores originating from the caulonemata of *E. spinulosum*. Also arising from the caulonemata are erect filaments in which there is a decrease in the brownish pigment, an increase in the number of chloroplasts per cell, and a change from obliquely to perpendicularly oriented cross-walls. These filaments terminate in the profusely branched, strongly chlorophyllose, dark-green velvety mats that appear to be the principal photosynthetic structures of the mature plants. It seems that these branches may be equivalent to the side branches of the caulonemata in *Funaria* (Bopp 1983). Branching of these secondary chloronemata appears to be environmentally influenced and quite plastic, varing from strictly dichotomous to irregular branching.

## Key to the Species of *Ephemerum*

1. Leaves ecostate; laminal cells smooth . . . . . . . . . . . . . . . . . . . . . . 1. *E. serratum.*
1. Leaves costate; laminal cells scindulose . . . . . . . . . . . . . . . . . . 2. *E. spinulosum.*

1. ***Ephemerum serratum*** (Hedw.) Hampe, Flora 20: 285. 1837.
*Phascum serratum* Hedw. Sp. Musc. Frond. 23. 1801.

Plants light-green to yellow-brown. Leaves 1-1.7 mm long, lanceolate, acuminate, usually ending in a single sharp cell; margins serrate-spinose, spines often wide-spreading to recurved; ecostate; laminal cells smooth. Dioicous or rhizautoicous; capsules brown, stomata restricted to the lower ½ or less of the exothecium. Spores 45-50 X 55-80 μm.

On soil. In Maine known from York County (*Thaxter* s.n., October 1914, with *E. spinulosum*, WTU).

*Ephemerum serratum* is distinguished by its ecostate, smooth-celled leaves with serrate to spinose margins. The spines are often wide-spreading and may even be recurved. *Ephemerum spinulosum* also has serrate-spinose leaf margins, but the laminal cells are scindulose, and the leaves are costate.

2. ***Ephemerum spinulosum*** Bruch & Schimp. ex Schimp., Syn. Musc. Eur. 6. 1860.
*Phascum serratum* Hedw. var. *angustifolium* Hook. & Wils. ex Drumm., Musci Amer. S. States no. 2, 1841, p.p.

Plants light-green. Leaves 1-2 mm long, linear-lanceolate, acuminate; margins serrate-spinose, spines spreading; costate, costae ending in leaf apices, sometimes not differentiated in lower 1/3 of leaf, scindulose dorsally; laminal cells scindulose dorsally. Reddish tubers sometimes produced on rhizoids. Dioicous or rhizautoicous. Capsules dark, obliquely apiculate, stomata restricted to the lower ½ or less of the exothecium. Spores 50-70 X 70-110 µm.

On bare soil in damp woods and dried pond bottoms. In Maine known from Penobscot (*Crane* s.n., CANM) and York (*Thaxter* s.n., October 12, 1914, with *Micromitrium megalosporum*, NY; *Thaxter* s.n. October 1914, with *E. serratum*, WTU) Counties.

*Ephemerum spinulosum* has spinose-margined, costate leaves, and scindulose laminal cells. The costae, however, can be difficult to see. The costal cells differ mostly from other laminal cells in having thicker walls, but in the proximal parts of the leaves such differentiation may not develop.

***Micromitrium*** Aust., Musci Appal. 10. 1870.
*Nanomitrium* Lindb., Not. Sällsk. F. Fl. Fenn. Förh. 13: 408. 1874.

Plants scattered to gregarious on sparse to moderately abundant protonemata. Leaves ± shrunken and crispate when dry, ecostate or nearly so, laminal cells thin-walled, oblong-hexagonal, collapsing when dry, smooth. Synoicous. Capsules rounded apically, dehiscing regularly along a median or near-median line, seldom rupturing irregularly, estomatose or stomatose, stomata either restricted to the base of the exothecium or to the distal half of the exothecium. Calyptrae persistent, consisting of only the archegonial remnants.

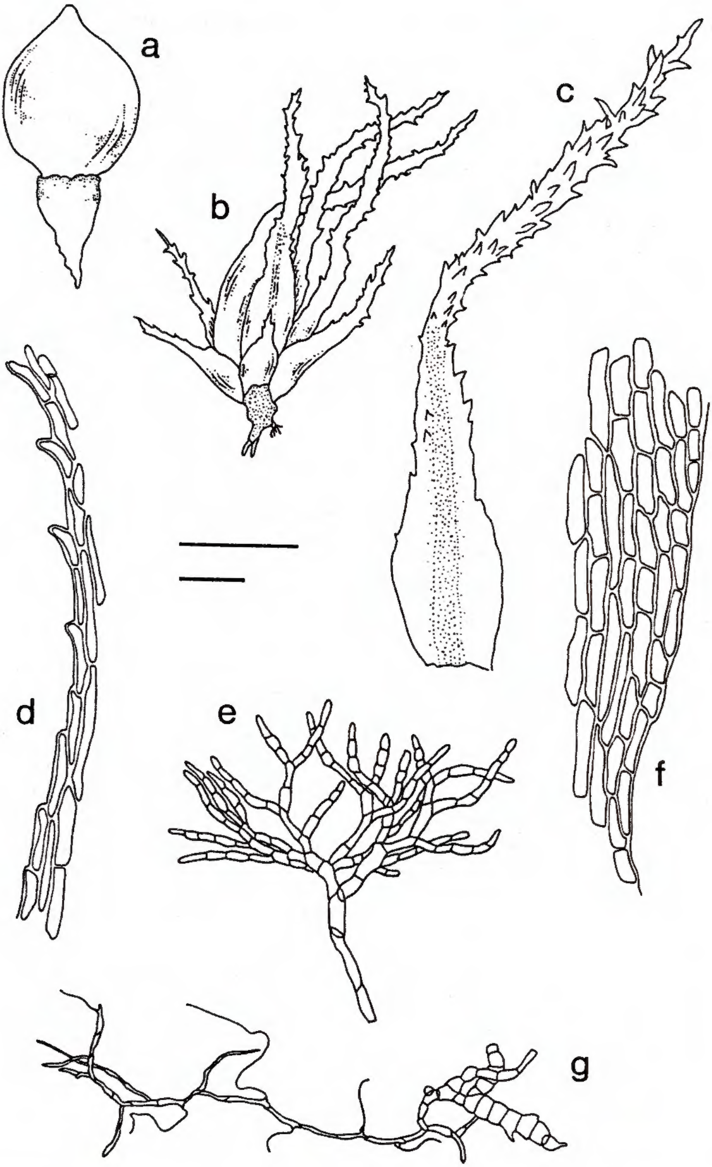

Figure 2. **Ephemerum spinulosum**. a. Sporophyte. b. Habit. c. Leaf. d. Median leaf cells and leaf margin. e. Protonemata, secondary chloronemata. f. Lower leaf cells and alar cells. g. caulonemata with tuber. Scales in mm: top = 0.01 (d,f); top = 0.2 (c,e); top = 0.5 (b,g); bottom = 0.2 (a).

The archegonium in most mosses remains developmentally active following syngamy, enlarging along with the embryo. Ultimately it is torn from the gametophore and carried aloft by the elongating seta as the calyptra. It has been demonstrated that in some mosses the calyptra plays an important role in capsule development. Its loss or removal too soon arrests the expansion and maturation of the capsule. The archegonium in *Micromitrium*, however, does not undergo enlargment following syngamy and the subsequent development of the embryo. Thus the resulting calyptra consists of only the remains of the unaltered archegonium carried aloft by the developing sporophyte. What part, if any, this calyptra might have on the development of the capsule is not known.

## Key to the Species of *Micromitrium*

1. Capsules dehiscing along a median line; exothecial cells lacking stomata . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1. *M. austinii.*
1. Capsules rupturing irregularly, rarely dehiscing along a median line; exothecial cells stomatose in distal half . . . . . . . . . . . . . . . . . . . . . . 2. *M. megalosporum.*

1. ***Micromitrium austinii*** Aust., Musci Appal. 45. 1870.
*Ephemerum austinii* Sull. ms.
*Nanomitrium austinii* (Aust.) Lindb., Not. Sällsk. F. Fl. Fenn. Förh. 13: 408. 1874.
*N. austinii* var. *floridanum* Grout, Moss Fl. N. Amer. 2 (2): 71. 1935.

Plants yellow-green. Leaves to ca. 1 mm long, lanceolate, short-acuminate; margins serrulate in distal half; ecostate, or costae barely evident in midleaf region. Capsules reddish to blackish at maturity, dehiscing along a median line of weak-walled cells, exothecial cells 1-layered, estomatose. Spores 24-39 X 23-29 μm, papillose.

In Maine known from a single collection without collector and locality (MCTC).

*Micromitrium austinii* is distingushed by its estomatose capsule wall that is composed of a single layer of cells. These characters are shared with *M. synoicum* (James) Aust., a species not yet known from Maine, and from which it differs by its narrower leaves with plane (neither incurved nor recurved), serrulate margins. Dehiscence of the capsules in both of these species is by a median line of weak-walled cells.

There can be 1 or 2 sporophytes produced in a single perichaetium of this species as seen in a specimen from Panama (*Hélion s.n.*, MICH) and a recent collection (*Allen 16896*, MO) from New Jersey.

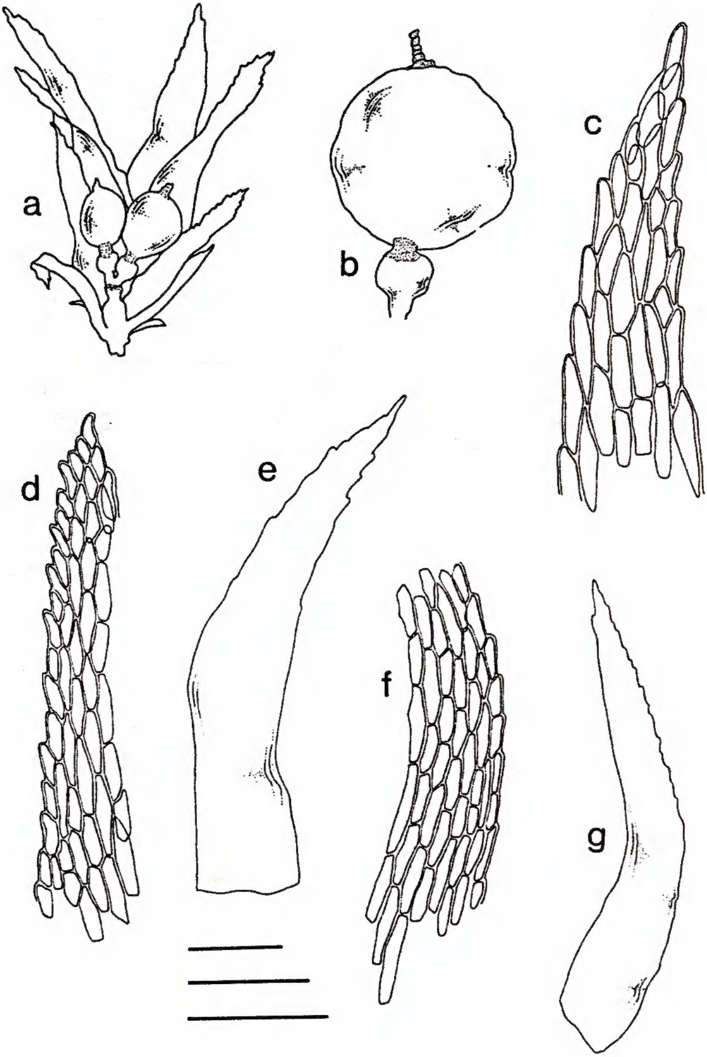

Figure 3. **Micromitrium austinii**. a. Habit. b. Sporophyte. c. & d. Leaf apices. e. & g. Leaves. f. Median leaf cells and leaf margin. Scales in mm: top = 0.01 (c,d,f); top = 0.2 (e,g); middle = 0.2 (b); bottom = 0.5 (a).

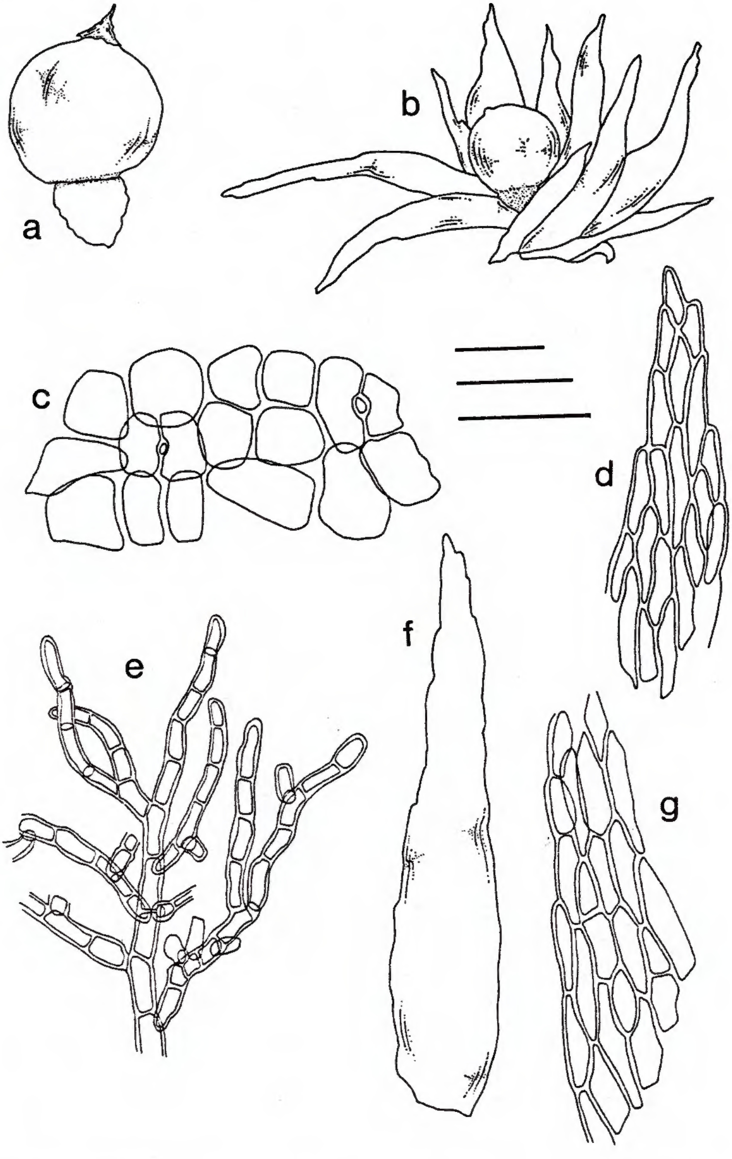

Figure 4. **Micromitrium megasporum**. a. Sporophyte. b. Habit. c. Exothecial cells and stomata. d. Leaf apex. e. Secondary chloronemata. f. Leaf. g. Median leaf cells and leaf margin. Scales in mm: top = 0.1 (e); middle = 0.1 (d,g); middle = 0.2 (a,f); middle = 0.05 (c) bottom = 0.5 (b).

2. ***Micromitrium megalosporum*** Aust., Musci Appal. 47. 1870.
*Nanomitrium megalosporum* (Aust.) Britt., Bull. Torrey Bot. Club 20: 304. 1893.
*Ephemerum megalosporum* Salm., Journ. Linn. Soc. London Bot. 34: 166. 1900.

Plants yellow-brown. Leaves lanceolate, short-acuminate, to ca. 1 mm long; margins serrulate in distal half or more; ecostate. Capsules yellow- or orange-brown at maturity, usually rupturing irregularly, infrequently dehiscing along a near median line of weak-walled cells; exothecial cells 2-layered, stomatose in distal half. Spores 60-82 X 42-58 µm, papillose to tuberculate.

On dried pond bottoms. In Maine known from York County (*Thaxter* s.n., October 12, 1914, with *Ephemerum spinulosum*, NY).

Plants of *M. megalosporum* have a brownish tinge. Moreover, the capsule wall is composed of two layers of cells, and dehiscence is usually accomplished by an irregularly rupturing of this wall. This feature is shared with *M. wrightii*, a species known only from Louisiana. Stomata in *M. megalosporum* are found only in the distal ½ of the capsule wall, whereas in *M. wrightii* they are restricted to the extreme proximal region.

**Acknowledgments.** We thank Virginia S. Bryan, Duke University, for her assistance in locating the specimens cited in this paper.

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# Distribution and Ecology of *Teloschistes contortuplicatus* in North America

Roger Rosentreter[1] and Bruce McCune[2]

*Teloschistes contortuplicatus* (Ach.) Clauz. & Rondon ex Vězda is "one of the most peculiar species of the European lichen flora; extraordinarily variable in growth-form, color, and pubescence" (Poelt 1969, translated by D. E. Anderegg). *Teloschistes contortuplicatus* has been known for North America for over 20 years yet there have been very few collections of this species. Because this distinctive species is far more frequent than the number of collections would indicate, and because it occupies a very specific habitat and substrate, we wrote this paper to better document the species in North America.

*Teloschistes contortuplicatus* has been known from the mountains of Europe (Poelt 1969; and see Vězda's Lich. Sel. Exs. 149 and 771) and Greenland (Hansen, Lich. Groenl. 360). Surprisingly, it is not known from Norway and Sweden (Santesson 1993). It was first reported for North America by Ahti et al. (1973) from the Northwest Territories of Canada. The next report for the species was an exsiccata by Anderson (1976) with a collection from Colorado. Anderson commented that *Teloschistes contortuplicatus* occurred at other localities in Colorado, Nevada, New Mexico, and Utah but cited no specific collections or locations. No further reports of the species have been made until recently (Weber & Wittmann 1992, DeBolt & McCune 1993, McCune & Goward 1995).

## Description

*Teloschistes contortuplicatus* (Ach.) Clauz. & Rondon ex Vězda is a dwarf fruticose lichen basally attached to the substrate. The tufted or decumbent thallus has lobes 0.3-1 mm wide and is very irregularly branched and warty, occasionally ciliate, and often variable in color. The lobe margins vary from warty or coralloid isidiate to almost sorediate. Specimens growing in bright sunlight are the typical orange of most *Teloschistes* while thalli growing deeper in the shaded crevices are yellow-green to light pale green or even grey or white in color. However, the apothecia are always orange even when the thallus is white.

## Methods

We found new locations in and near the Rocky Mountains by searching likely habitats. We also checked regional and national herbaria (ALTA, ASU, COLO, DAV, H, ID, MONT, MONTU, ORE, OSC, SRP, UBC, UC, US, WIS, WTU, and the herbaria of Trevor Goward, Bruce Ryan, and the authors).

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## Distribution in North America

*Teloschistes contortuplicatus* was absent from most herbaria. This is probably due to its small size and its occurrence in specific habitats. However, we have found the species to be fairly common in crevices in calcareous rocks in montane and steppe habitats throughout the northern Rocky Mountains. *Teloschistes contortuplicatus* occurs from Greenland and the Northwest Territories south through the Rocky Mountains to Colorado and New Mexico (Figure 1). It also occurs both east and west of the main mountain mass, for example in eastern Montana, southern Idaho and Utah, and the steppe area in south-central British Columbia. Although it has not yet been reported from the Canadian Rockies of Alberta and British Columbia, it almost certainly will be found there.

## Selected Specimens

Specimens are in the collectors' herbaria unless otherwise referenced. CANADA: BRITISH COLUMBIA: Marble Canyon Provincial Park, 600 m, *McCune 21836.* GREENLAND: Peary Land, *Hansen, Lich. Groenl. 360.* USA: COLORADO: Rio Blanco Co., on limestone, *Weber L-83554, Weber & Shushan L-39346* (COLO). Summit Co., on shale outcrops, 2740 m, *R. Anderson, Lich. W. N. Amer. No. 1.* (COLO, US). IDAHO: Adams Co., limestone, 1067 m, *Rosentreter 4270.* Caribou Co., in cracks beneath overhang of porous travertine cliffs, 1829 m, *Rosentreter 3761* (CANL, UPS, US), *Rosentreter 3501, 3503.* Cassia Co., on rock, 1920 m, *Rosentreter 7939.* Custer Co., barren talus slopes, calcareous Challis volcanics, 1890 m, *Rosentreter 4970.* Lemhi Co., on limestone, 2050 m, *Rosentreter 3956.* MONTANA: Beaverhead Co., N-facing mossy cliffs of dark limestone, 2015 m, *McCune 20695.* Carbon Co., steep slopes with limestone outcrops, 1130 m, *McCune 14545.* Glacier Co., on rock, 2280 m, *McCune 16846.* Madison Co., on limestone occurring on overhanging cracks, 1676 m, *Rosentreter 2864* (GRZ, US, WIS ). Lake Co., cracks in limestone beneath overhang, 920 m, *Rosentreter MT-118.* Teton Co., on limestone outcrops, *Pinus flexilis* savanna, 1480 m, *McCune 15137.* NEVADA: Clark Co., on limestone, *Collins 760* (COLO). NEW MEXICO: Bernalillo Co., on limestone rimrock, 3100 m, *Shushan S-6571* (COLO). UTAH: Tooele Co., on dry limestone cliffs, 1615 m, *Flowers 675* (ALTA, COLO, UBC).

## Ecology

*Teloschistes contortuplicatus* is restricted to limestone, calcareous sandstone, other lime containing rocks (HCL+), and travertine. It is almost always found beneath overhanging ledges, on near-vertical faces, or in otherwise sheltered crevices. The hidden habitat and the dwarf tufted habit of the species account for it being overlooked by most collectors. Other unusual species are often found associated with *T. contortuplicatus* in this microhabitat: *Anaptychia ulotrichodes* (Vain.) Vain., *Phaeophyscia constipata* (Norrl. & Nyl.) Moberg, and *Physconia thomsonii* Essl.

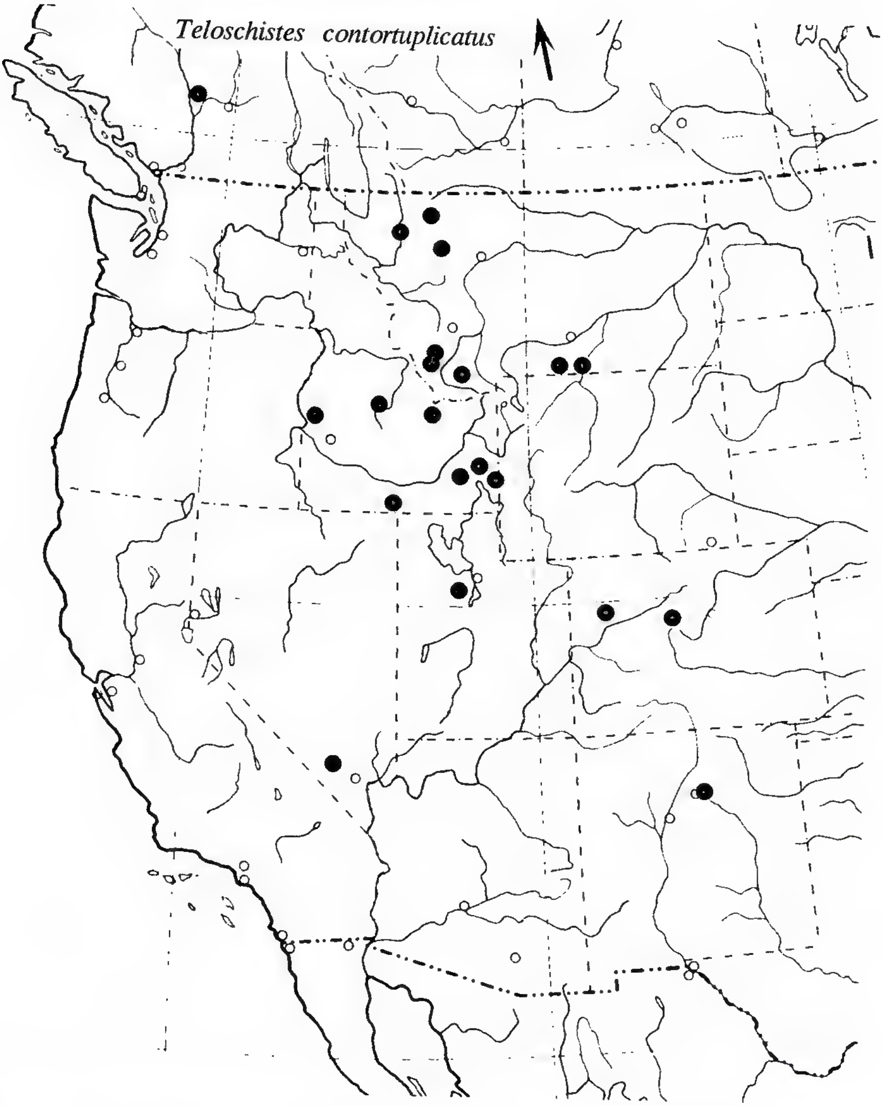

Figure 1. Distribution of *Teloschistes contortuplicatus* in North America. The arrow indicates an additional site in the Northwest Territories (Ahti et al. 1973). Map adapted from Goode Basemap.

The occurrence of *Teloschistes contortuplicatus* in the microhabitats formed by cracks and crevices in limestone is unusual for a fruticose species. In at least some cases, its source of water appears to be seepage out of the rock rather than direct precipitation or trickle lines. This is evident at times by the white calcareous precipitate that often accumulates on the lichen.

*Teloschistes contortuplicatus* occurs from low to high elevations. In the northern Rocky Mountains and surroundings it is known from 600 m in British Columbia to 2280 m in Glacier County, Montana. In the more southern mountains it typically is at higher elevations (2000-3200 m). The geographic and elevational distribution suggests that it prefers cold continental and semi-continental climates. In Europe, it is known only from montane habitats while in North America we have found it in alpine, montane, and steppe habitats.

**Acknowledgements**. We thank the late Prof. Josef Poelt for initially identifying material sent to him by the first author, Ann DeBolt for reviewing the manuscript, and curators of herbaria for loans and hospitality.

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# Some Alaskan Bryophytes

Carl Darigo[1]

This paper reports on bryophytes collected in two widely separated Alaskan locations, Northway and Kiska Island. Alaska, the largest state at some 586,400 square miles, is one-fifth the size of the United States mainland, and two and one-half times bigger than Texas. Alaska's coastline is longer than that of the continental United States and Alaska contains five mountain ranges, one of which includes 20,320 foot Mount McKinley, the highest peak in North America. Alaskan winters are long and summers short, and weather is consistent with its northern latitude span from 50° to north of the Arctic Circle.

Northway is located in southeastern interior Alaska near the Alaska Highway, approximately 30 miles north of Wrangell Mountains National Park and 40 miles west of Yukon Territory. The area is included in the Tetlin National Wildlife Refuge near the Nabesna River and generally consists of ponds, marshy areas and black spruce forest at 1,700 - 1,800 feet elevation. Northway is the site of Northway Airfield, used in World War II as a military supply staging area and also as a base for wartime construction of the Alaska Highway.

The Aleutian Islands extend 1,100 miles southwest and then northwest from the tip of the Alaskan penisula and separate the Bering Sea on the north from the Pacific Ocean on the south. Kiska Island, in the Rat Island Group of the Aleutian Islands, is approximately 200 miles east of Attu, the westernmost island. Kiska's area is 110 square miles, with length of 25 miles and width varying from 2 to 7 miles. Elevations range from sea level to Kiska Volcano at 4,000 feet. High winds, heavy rainfall and persistent fog reflect the generally inclement weather. The island vegetation consists mainly of maritime tundra, no trees, but substantial growths of grasses, sedges and flowering plants. Kiska is uninhabited and administered by the U. S. Fish and Wildlife Service as part of the Alaska Maritime National Wildlife Refuge. Kiska was occupied by the Japanese in World War II and bombed intensively by American forces before the Japanese withdrew in 1943. Portions of the island have been designated as the Japanese Occupation Site, Kiska Island National Historical Landmark. An article by D. J. Lenihan in the June 1992 Natural History magazine has several excellent color photographs of the Kiska Island environment.

Nancy Darigo is a geologist in Alaska with Dames & Moore Inc., an environmental consulting firm. Her recent projects, conducted for the U. S. Army Engineer District,

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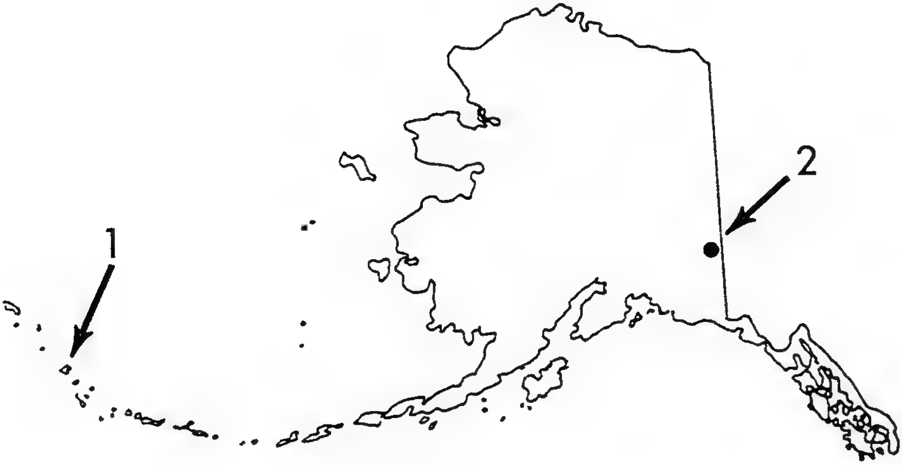
Alaska, involved visiting the subject locations. She, together with Dave Erikson, a biologist with Dames & Moore Inc., knowing the author's interest in bryophytes, collected some specimens during visits to the two locations. All moss specimens were verified by Bruce Allen, liverwort specimens by Alan Whittemore, and are deposited in MO.



**Northway-- Mosses**

AMBLYSTEGIACEAE

***Sanionia uncinata*** (Hedw.) Loeske var. ***uncinata***. Fuel spill area near southeast corner of Ham Lake. *N. Darigo 7B.*

DICRANACEAE

***Dicranum acutifolium*** (Lindb. & Arnell) C. Jens. ex Weinm. Forest near VOR Road. *N. Darigo 12.*

***D. tauricum*** Sapeh. Broken asphalt of airfield runway. *N. Darigo 8.*

DITRICHACEAE

***Ditrichum flexicaule*** (Schwaegr.) Hampe. Fuel spill area near southeast corner of Ham Lake. *N. Darigo 7A.*

HYLOCOMIACEAE

***Hylocomium splendens*** (Hedw.) Schimp. in B.S.G. Forest near VOR Road. *N. Darigo 11.*

HYPNACEAE

***Hypnum circinale*** Hook. Forest near VOR Road. *N. Darigo 10.*

**Kiska Island - Mosses**

AMBLYSTEGIACEAE

***Sanionia uncinata*** (Hedw.) Loeske var. ***uncinata***. Tundra near pass at 1,200 feet, between Japanese submarine base and Gertrude Cove. *Erikson 2.*

BRACHYTHECIACEAE

***Brachythecium frigidum*** (C. Mull.) Besch. Wet sedge meadow at northwest Camp Creek. *N. Darigo 15.*

GRIMMIACEAE

***Racomitrium fasciculare*** (Hedw.) Brid. Thin, sandy soil layer on aluminum wing surface of crashed American aircraft. *N. Darigo 30.*

***R. heterostichum*** (Hedw.) Brid. Wood remains of Japanese gun emplacement near Canadian Camp. *N. Darigo & Erikson 18.*

***R. lanuginosum*** (Hedw.) Brid. Soil along old road near Gertrude Cove. *N. Darigo 21.* Thin, sandy soil layer on metal surface of beached Japanese submarine at Trout Lagoon. *N. Darigo 28.*

HYLOCOMIACEAE

***Hylocomium splendens*** (Hedw.) Schimp. in B.S.G. Tundra near pass at 1,200 feet, between Japanese submarine base and Gertrude Cove. *Erikson 5.*

***Pleurozium schreberi*** (Brid.) Mitt. Tundra near pass at 1,200 feet, between Japanese submarine base and Gertrude Cove. *Erikson 4.*

***Rhytidiadelphus squarrosa*** (Hedw.) Warnst. Disturbed soil at Japanese gun emplacement near Canadian Camp. *N. Darigo & Erikson 16.*

LEUCODONTACEAE

***Antitrichia curtipendula*** (Hedw.) Brid. var. ***curtipendula***. Tundra near upland point overlooking Gertrude Cove. *N. Darigo 26.*

MNIACEAE

***Rhizomnium pseudopunctatum*** (Bruch & Schimp.) T. Kop. Charred wood of underground Japanese bomb shelter at Gertrude Cove. *N. Darigo 22.*

POLYTRICHACEAE

***Polytrichastrum alpinum*** (Hedw.) G. L. Sm. var. ***alpinum***. Tundra near pass at 1,200 feet, between Japanese submarine base and Gertrude Cove. *Erikson 1.*

SPAHGNACEAE

***Sphagnum compactum*** DC. in Lam. & DC. Soil along old road near Gertrude Cove. *N. Darigo 20.*

**Kiska Island -- Liverworts**

ANTHELIACEAE

***Anthelia*** (Dumort.) Dumort. ***sp.*** Thick cake of sandy soil on metal surface of beached Japanese submarine at Trout Lagoon. *N. Darigo 29.*

JUNGERMANNIACEAE

***Jungermannia atrovirens*** Schleich. ex Dumort. Concrete at vehicle service pits near Canadian Camp. *N. Darigo & Erikson 17.*

***Lophozia*** (Dumort.) Dumort. ***sp.*** Thin, sandy soil layer on metal surface of beached Japanese submarine at Trout Lagoon. *N. Darigo 27.*

SCAPANIACEAE

***Diplophyllum albicans*** (L.) Dumort. Charred wood on underground Japanese bomb shelter at Gertrude Cove. *N. Darigo 23.*

**Acknowledgments**: The author wishes to thank U. S. Fish and Wildlife Service for giving permission to collect the specimens, and Bruce Allen and Alan Whittemore of the Missouri Botanical Garden for sharing their time and expertise.

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# Checklist of bryophytes for two hemlock ravines in the Delaware Water Gap National Recreation Area

Natalie L. Cleavitt and Timothy J. Fahey[1]

A total of 123 species of bryophytes were found in a survey of two eastern hemlock (*Tsuga canadensis* (L.) Carriere.) dominated ravines within the Delaware Water Gap National Recreation Area (DWG, NRA) during 1994 and 1995. Although the DWG is historically well collected (Moul, 1952), most collections have been from the southern end of the NRA. The areas surveyed here are at the northern end of the DWG and resulted in several county records and one state record. There are 28 new county records for Sussex Co., New Jersey (Karlin & Schaffroth, 1992) and 67 new county records for Pike Co., Pennsylvania (Allen, 1979, Lanfear, 1933, Little, 1931 & 1932, Manuel, 1975, Moul, 1952, and Pursell, 1973 & 1975). *Lophocolea cuspidata* (Nees.) Limpr. is reported as new for the state of Pennsylvania. It was found in mats over moist rocks of waterfalls in Adams Creek.

This list represents part of a baseline study by the National Park Service to document the flora and fauna of these hemlock ravines (Adams Creek and Van Campens Brook) prior to disturbance by the hemlock woolly adelgid (*Adelges tsugae* Annand). The hemlock woolly adelgid is an alien pest that has been gradually infesting hemlock stands of the eastern United States (Mc Clure, 1991). The two surveyed ravines exhibit differing orientation, slope, bedrock geology and land use history. Regional climate is humid continental with mean monthly temperatures of 9.7°C and mean precipitation of 122 cm. Approximately 3 km of stream and surrounding ravine area were surveyed at each site.

Adams Creek is an east-west flowing stream located in Delaware Township, Pike Co., Pennsylvania. Adams Creek ravine is underlain by dark gray silt stone and slate of the Devonian (375 mybp - Mc Intosh & Eister, 1981). Mean soil pH was 4.11 with high values of 6.28 and 5.35 at two streamside sites. The site was in private ownership under a wealthy estate up until the late 1980s when it was purchased by the National Park Service. Tree harvesting was likely limited to selective cuts and larger scale felling of hemlocks for tannin probably did not occur here due to private ownership for recreation and the severe slope of the ravine sides (National Park Service pers. Comm.). The tree canopy in the ravine is dominated by hemlock, black birch (*Betula lenta* L.) and white pine (*Pinus strobus* L.). The ravine sides are quite steep and range from 12 - 80% slope.

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Van Campens Brook runs north to south through the Town of Wallpack, Sussex Co., New Jersey. The brook runs over hard red/purple sandstone formed during the Silurian (420 mybp) (NJ Geol. Survey, 1989). Mean soil pH was 3.85 with a high value of 4.97. Van Campens site has been cleared and pastured in the past and white pine is completely absent. The tree canopy in the ravine is dominated by hemlock, black birch, and yellow birch (*Betula alleghanienses* Britton). This ravine is gentler than Adams Creek, ranging from 3 - 25 % slope.

Adams Creek (107 spp.) had a much richer bryoflora than Van Campens Brook (60 spp.) including several bryophytes which prefer more alkaline conditions such as *Preissia quadrata* (Scop.) Nees., *Aneura pinguis* (L.) Dum., *Campylium chrysophyllum* (Brid.) J. Lange and *Bryum pseudotriquetrum* (Hedw.) Gaertn. et al. The younger, more alkaline bedrock and the steep gorges and waterfalls available at Adams Creek account for the greater bryophyte diversity found there. The heavier development and historical pasturing around Van Campens Brook must also explain the lower diversity found at that site.

All collections were made by the first author. Collections are listed by state. All collections listed here are deposited at the Bailey Hortorium (BH), Cornell University. For some common species only one specimen from either site was deposited in the herbarium. Extensive collections were made during quantitative sampling at 92 permanent plots in the ravines. Therefore, although sometimes no collection number is given next to the state abbreviation, all specimens listed here were verified with a microscope. Taxonomy and nomenclature follows Anderson, Crum & Buck (1990) for mosses except *Sphagnum* which follow Anderson (1990). Liverworts follow Stolter & Crandall-Stolter (1977) except for the genus *Solenostoma* which is after Schuster (1966 - 1992).

## LIVERWORTS (27spp.)

### Aneuraceae
*Aneura pinguis* (L.) Dum.: PA 1300
*Riccardia multifida* (L.) S.Gray.: PA 1312

### Calypogeiaceae
*Calypogeia fissa* (L.) Raddi subsp. *neogea* Schust.: PA 114
*C. muelleriana* (Schiffn.) K.Müll.: NJ 157
*C. trichomanis* (L.) Corda: PA 1315

### Cephaloziaceae
*Cephalozia bicuspidata* (L.) Dum. subsp. *bicuspidata*: NJ 1314, PA
*Nowellia curvifolia* (Dicks.) Mitt.: NJ 124, PA 199

**Conocephalaceae**
*Conocephalum conicum* (L.) Lindb.: NJ, PA 524

**Jubulaceae**
*Frullania eboracensis* Gott.: NJ 102, PA 175
*F. riparia* Hampe ex Lehm.: NJ 104
*Jubula pennsylvanica* (Steph.) Evans.: NJ 714; PA 713

**Jungermanniaceae**
*Odontoschisma denudatum* (Nees. ex Mart.) Dum.: NJ 1316
*Solenostoma gracillimum* (Smith.) Schust.: PA 1310
*S. pumillum* (With.) K. Müll.: PA 139

**Lepidoziaceae**
*Bazzania trilobata* (L.) S. Gray : NJ, PA 112

**Lophocoleaceae**
*Lophocolea cuspidata* (Nees.) Limpr.: PA 1299
*L. heterophylla* (Schrad.) Dum.: NJ 120, PA 194

**Marchantiaceae**
*Preissia quadrata* (Scop.) Nees.: PA 1302

**Metzgeriaceae**
*Metzgeria conjugata* Lindb.: PA 1303

**Ptilidiaceae**
*Ptilidium pulcherimum* (G. Web.) Hampe: PA 133

**Porellaceae**
*Porella pinnata* L.: PA 214
*P. platyphylloidea* (Schwein.) Lindb.: PA 374

**Radulaceae**
*Radula complanata* (L.) Dum.: NJ, PA 134

**Scapaniaceae**
*Diplophyllum apiculatum* (Evans) Steph. : PA 165
*Scapania nemorosa* (L.) Dum.: NJ, PA 218
*S. undulata* (L.) Dum.: PA 1306

**Trichocoleaceae**
*Trichocolea tomentella* (Ehrh.) Dum.: NJ 148, PA 143

## MOSSES (96spp.)

**Amblystegiaceae**
*Amblystegium serpens* (Hedw.) Schimp. in B.S.G.: NJ 115, PA 234
*Campylium chrysophyllum* (Brid.) J. Lange: PA 742
*C. radicale* (P.-Beauv.) Grout: PA 520
*Hygroamblystegium fluviatile* (Hedw.) Loeske: PA 103
*Hygrohypnum eugyrium* (B.S.G.) Loeske: NJ 105, PA 181
*H. molle* (Hedw.) Loeske: PA 527
*Leptodictyum riparium* (Hedw.) Warnst.: PA 116
*Warnstorfia exannulata* (Schimp. in B.S.G.) Loeske: NJ 166

**Anomodontaceae**
*Anomodon attenuatus* (Hedw.) Hüb.: NJ 147, PA 233
*A. rostratus* (Hedw.) Schimp.: NJ 188, PA 153

**Bartramiaceae**
*Bartramia pomiformis* Hedw.: PA 523, 697

**Brachytheciaceae**
*Brachythecium acuminatum* (Hedw.) Aust.: NJ 365
*B. plumosum* (Hedw.) Schimp. in B.S.G.: NJ 745, PA 232
*B. populeum* (Hedw.) Schimp. in B.S.G.: PA 525
*B. rivulare* Schimp. in B.S.G.: PA 526
*B. salebrosum* (Web. & Mohr.) Schimp. in B.S.G.: PA 367, 741
*Bryhnia graminicolor* (Brid.) Grout: PA 154
*B. novae-angliae* (Sull. & Lesq. in Sull.) Grout: NJ, PA 152
*Eurhynchium pulchellum* (Hedw.) Jenn.: PA 167
*Platyhypnidium riparoides* (Hedw.) Dix.: NJ 169, PA 168

**Bryaceae**
*Bryum pseudotriquetrum* (Hedw.) Gaertn. et al.: PA 1308
*Pohlia nutans* (Hedw.) Lindb.: NJ 132, PA 210, 744
*Rhodobryum ontariense* (Kindb.) Par. in Kindb. : PA 137

**Buxbaumiaceae**
*Diphyscium foliosum* (Hedw.) Mohr.: PA 1304

**Climaciaceae**
*Climacium americanum* Brid.: PA 229
*C. dendroides* (Hedw.) Web. & Mohr.: NJ 158

**Dicranaceae**
*Dicranella heteromalla* (Hedw.) Schimp.: NJ 187, 160, PA 161
*Dicranum flagellare* Hedw.: PA 373
*D. fulvum* Hook.: NJ 162, PA
*D. montanum* Hedw.: NJ, PA 228
*D. scoparium* Hedw.: NJ, PA 189
*D. spurium* Hedw.: PA 163
*Oncophorus wahlenbergii* Brid.: PA 198
*Rhabdoweisia crispata* (With.) Lindb.: PA 135

**Entodontaceae**
*Entodon brevisetus* (Hook. & Wils. ex Wils.) C. Müll.: NJ 127
*E. cladorhizans* (Hedw.) C. Müll.: PA 97

**Fissidentaceae**
*Fissidens dubius* P. Beauv.: NJ 171, PA 170
*F. osmundoides* Hedw.: PA 98
*F. subbasilaris* Hedw.: NJ 366, PA 99

**Fontinalaceae**
*Fontinalis antipyretica* Hedw.: PA 100
*F. dalecarlica* Schimp. ex B.S.G.: NJ 101

**Grimmiaceae**
*Rhacomitrium aciculare* (Hedw.) Brid.: PA 216
*Schistidium rivulare* (Brid.) Podp.: PA 1313

**Hedwigiaceae**
*Hedwigia ciliata* (Hedw.) P-Beauv.: NJ 173, PA 176

**Hylocomiaceae**
*Hylocomium splendens* (Hedw.) B.S.G.: PA 106
*Loeskeobryum brevirostre* (Brid.) Fleisch. in Broth.: PA 1307
*Pleurozium schreberi* (Brid.) Mitt.: PA 131
*Rhytidiadelphus triquetrus* (Hedw.) Warnst.: PA 376

**Hypnaceae**
*Callicladium haldanianum* (Grev.) Crum: NJ 156, PA 155

*Herzogiella striatella* (Brid.) Iwats.: PA 369
*H. turfacea* (Lindb.) Iwats.: NJ 177, PA 370
*Homomallium adnatum* (Hedw.) Broth.: PA 178
*Hypnum cuppressiforme* Hedw.: PA 107
*H. curvifolium* Hedw.: PA 108
*H. fertile* Sendtn.: PA 109
*H. imponens* Hedw.: NJ, PA 110
*H. pallescens* (Hedw.) P-Beauv.: NJ 138, PA 111
*Isopterygiopsis muelleriana* (Schimp.) Iwats.: PA 113
*I. pulchella* (Hedw.) Iwats.: PA 372
*Isopterygium tenerum* (Sw.) Mitt.: NJ 743
*Platygyrium repens* (Brid.) B.S.G.: NJ 205, PA 208
*Pseudotaxiphyllum elegans* (Brid.) Iwats.: NJ 186, PA 151
*Pylaisiella selwynii* (Kindb.) Crum et. al.: NJ, PA 215

**Leskeaceae**
*Leskea gracilescens* Hedw.: PA 812
*Lindbergia brachyptera* (Mitt.) Kindb.: PA 119

**Leucobryaceae**
*Leucobryum glaucum* (Hedw.) Angstr. ex. Fr.: NJ 381, PA 117

**Leucodontaceae**
*Leucodon brachypus* Brid.: NJ 191, PA 118

**Mniaceae**
*Mnium ambiguum* H.Müll.: PA 1298
*M. hornum* Hedw.: NJ 197, PA 121
*Plagiomnium ciliare* (C. Müll.) T. Kop: NJ, PA 125
*P. cuspidatum* (Hedw.) T. Kop: NJ, PA 126
*P. ellipticum* (Brid.) T. Kop.: PA 1305
*Rhizomnium punctatum* (Hedw.) T. Kop: NJ 217, PA 136

**Neckeraceae**
*Homalia trichomanoides* (Hedw.) B.S.G.: PA 179
*Neckera pennata* Hedw. : NJ 123
*Thamnobryum alleghaniense* (C. Müll.) Nieuwl.: PA 221

**Orthotrichaceae**
*Amphidium mougeotii* (Bruch. & Schimp. in B.S.G.) Schimp.: PA 149, 227
*Ulota crispa* (Hedw.) Brid.: NJ 226, PA 144
*U. hutchinsiae* (Sm.) Hammar.: PA 1301

**Plagiotheciaceae**
*Plagiothecium cavifolium* (Brid.) Iwats.: PA 200
*P. laetum* B.S.G.: NJ 202, PA 128

**Polytrichaceae**
*Atrichum undulatum* (Hedw.) P.-Beauv.: NJ 150
*Polytrichum ohioense* Ren. & Card.: NJ 211, PA 377
*P. pallidisetum* Funck.: NJ 382

**Pottiaceae**
*Tortella humilis* (Hedw.) Jenn.: NJ 225, PA 375

**Sematophyllaceae**
*Brotherella recurvans* (Michx.) Fleisch.: NJ, PA 230
*Sematophyllum adnatum* (Michx.) Britt.: NJ 702
*S. demissum* (Wils.) Mitt.: NJ 219

**Sphagnaceae**
*Sphagnum affine* Russow.: PA 380
*S. palustre* L.: NJ 220
*S. subtile* (Russow.) Warnst.: PA 379

**Tetraphidaceae**
*Tetraphis pellucida* Hedw.: NJ 140, PA

**Theliaceae**
*Myurella sibirica* (C. Müll.) Reim.: PA 122
*Thelia hirtella* (Hedw.) Sull.: NJ 141

**Thuidiaceae**
*Cryto-hypnum minutulum* (Hedw.) Buck & Crum: PA 224
*Thuidium delicatulum* (Hedw.) B.S.G. : NJ, PA 142

**Acknowledgements.** These surveys were completed under contract agreement CA 4000-3-2022 from the National Park Service. Richard Evans has been helpful throughout this project. Nancy Slack and Sarah Cooper-Ellis provided invaluable assistance and encouragement with bryophyte identification in the field and the labratory. Ross Priddle and Jeff Schreiner each spent two days in the field with Nat Cleavitt and their keen eyes helped to make this list more complete. Dick Andrus verified the *Sphagnum* species. Norton Miller helped with several of the liverworts and some difficult moss specimens. Benito Tan also identified a tricky moss specimen for this list.

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# ***Sphagnum trinitense* C. Müll. in New York State**

William R. Town and Marilou Pudiak-Town[1]

Abstract. *Sphagnum trinitense* C. Müll. was recently collected in northern Clinton County in New York State, approximately 6 kilometers from the Canadian border. This discovery is a significant range extension for the species in New York State.

*Sphagnum trinitense* C. Müll. (*S. cuspidatum* var. *serrulatum* (Schliephacke) Schliephacke) is a Western Hemisphere Atlantic coastal plain endemic (Andrus, 1980) belonging to section *Cuspidata* of the genus *Sphagnum*. It is typically found submerged in relatively oligotrophic habitats, in flowing water of drainage ditches and in shallow ponds (Crum, 1984; Crum & Anderson, 1981). Distinguishing characters include an undifferentiated or poorly differentiated stem cortex, triangular ovate stem leaves with an acute to narrowly obtuse apex and more or less fibrillose hyaline cells with at least some 1-divided. Branch leaves vary from short and broadly truncate to rounded at the branch base and near the capitulum to very long, lanceolate-linear at the branch tips and distinctly serrulate at least in the upper third of the branch leaf with none to several small pores at the cell ends and near the commissures. Branch leaf chlorophyll cells in cross section are trapezoidal and broadly exposed on the concave surface.

In North America, it has been reported from Massachusetts to Florida along the coast and west to Louisiana as well as up the Mississippi River drainage to southeastern Kansas and southern Illinois (Andrus, 1980). Until about 1980, it had been reported in New York State only from the southern fork of eastern Long Island. There it occurred as scattered, free-floating plants at the perimeter of sandy-bottomed ponds where it occurred with *S. torreyanum, S. cuspidatum* and *S. lescurii*. It was collected in 1982 from a depth of ca. 1 meter in a small kettlehole bog in southern Saratoga County, New York (45°57'N, 73°44'W) where it remains the only bottom-dwelling *Sphagnum* species. However, the surrounding bog mat supports *S. cuspidatum* and *S. fallax*. About 1990, *S. trinitense* was collected at a depth of ca. 15 meters in Lake Minnewaska in Ulster County, New York (41°43'N, 74°14'W) as, again, the only *Sphagnum* species. The lake shore did, however, support *S. palustre, S. fallax, S. russowii, S. compactum* and *S. lescurii*. In 1995, *S. trinitense* was collected submerged at various depths (0.1 to +1.5 meters) in several water-filled shallow and deep depressions in Potsdam Sandstone near Altona in Clinton County, New York (44°52'N, 73°37'W). Here again, it was the only submerged *Sphagnum* species but it grew luxuriously on a thick supporting mat of *Drepanocladus fluitans* (Hedw.) Warnst.

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In all localities in New York State where *Sphagnum trinitense* was collected, the hanbitats were similar and characterized by more or less sandy bottom or sand/sediment covered-bottom ponds or lakes, pH ranging from 4.5 to 5.2 and relatively clear water. Elevations varied from ca. 3 meters on Long Island, ca. 110 meters in Saratoga County, ca. 240 meters in Clinton County to ca. 500 meters at Lake Minnewaska. The new Clinton County site brings the limit of *Sphagnum trinitense* approximately 500 kilometers northward in New York State and greatly increases the possibility that it might yet be found in Canada.

Voucher specimens of *S. trinitense* from all sites mentioned are deposited in the S.U.N.Y. at Binghamton, Binghamton, New York herbarium and the T.P.S., Inc. herbarium in Clifton Park, New York.

**Acknowledgements.** We thank Mr. Tom Montgomery for his patient guidance at the Clinton County sites and Dr. Richard E. Andrus for both confirming the *S. trinitense* collections and for valuable comments on this manuscript.

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# *Hygrohypnum subeugyrium* and *Clasmatodon parvulus* in Pennsylvania

Bruce Allen[1]

There has been considerable bryological activity in Pennsylvania, yet some areas remain scarcely collected. For the past few years Ronald Pursell and I have been making general bryophyte collections, mostly in north-central Pennsylvania. As a result of this work we have made several interesting finds. Two of these are *Hygrohypnum subeugyrium* (Ren. & Card.) Broth. and *Clasmatodon parvulus* (Hampe) Hook. & Wils. ex Sull. in Gray, both apparently new to Pennsylvania.

*Hygrohypnum subeugyrium*, Pennsylvania. Union County, White Deer Township, near White Deer Creek ca 3 miles west of White Deer Furnace. Tiadghton State Forest, *Allen 16833* (MO), *Allen 16845* (MO), *Pursell 11500* (MO).

This species was common on boulders in and along a small spring run that paralleled White Deer Creek. *Hygrohypnum eugyrium* was found in and along White Deer Creek. Tuomikoski et al. (1973) provisionally united *H. eugyrium* and *H. subeugyrium*, a view not held by Jamieson (1976) or Crum & Anderson (1981). In the White Deer locality these two taxa could be distinguished in the field. *Hygrohypnum subeugyrium* (Fig. 1) was a smaller plant with narrower, strongly falcate-secund leaves. *Hygrohypnum eugyrium* (Fig. 2) was larger and had loosely erect-spreading to erect-falcate leaves with an aspect very much like *Sematophyllum marylandicum*. Microscopically both species had similar weakly serrulate apical leaf margins, but greatly different alar cells. In *H. subeugyrium* the alar cells are quadrate to short rectangular and incrassate. Often there is a single row of enlarged, incrassate cells superimposed across the leaf base. This basal row of cells appears to be associated with the leaf insertions. In *H. eugyrium* the alar region is composed of 6-12 enlarged, inflated, thin-walled and bulging cells of a form reminiscent of those seen in *Sematophyllum marylandicum*. In both *H. subeugyrium* and *H. eugyrium* the outer alar cells are hyaline, but in the former species the inner cells are yellowish while those of latter species are dark orange to red-brown.

The type of *H. subeugyrium* is from Newfoundland. Jamieson (1976) added Ontario, Quebec, Nova Scotia, St. Pierre Miquelon, Tennessee, New York and New Hampshire to the eastern North America distribution of the species. Crum & Anderson (1981) verified its presence only from Newfoundland and considered Tennessee material examined by Jamieson *H. eugyrium*. In addition to the Pennsylvania collections reported here, I have verified the presence of *H. subeugyrium* in Nova Scotia (*Allen 2164*, MO) and Maine (Allen 1993).

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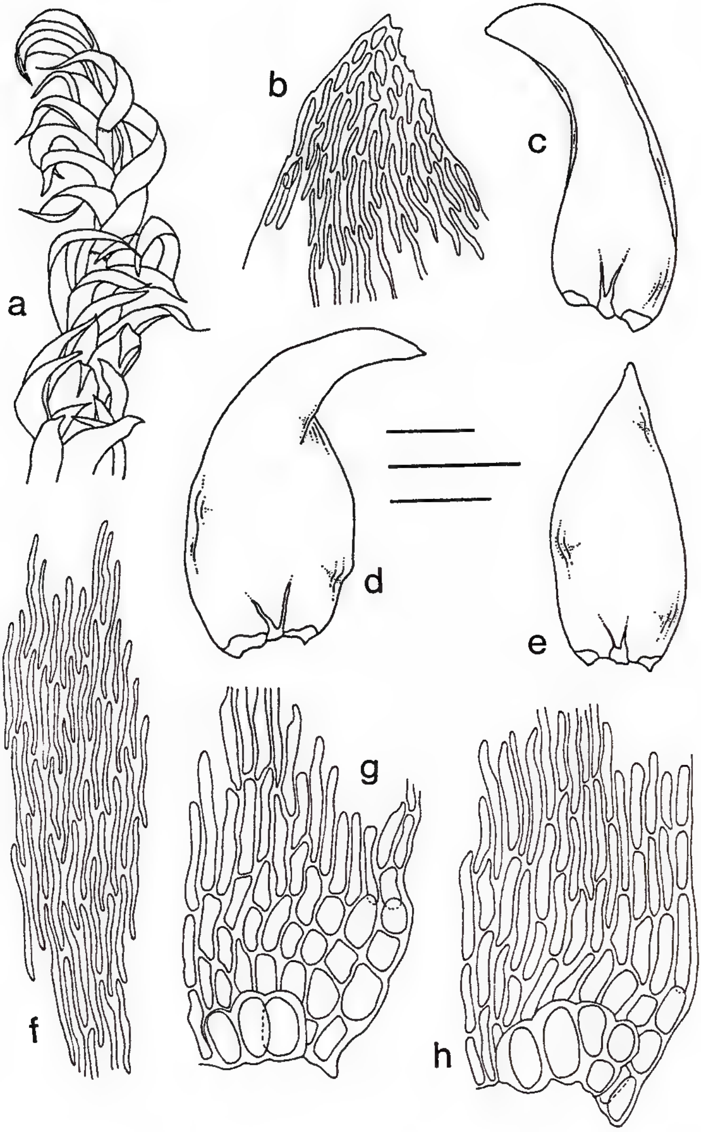

Plate 1. **Hygrohypnum subeugyrium**. a. Habit. b. Leaf apex. c. & e. Leaves. f. Median leaf cells. g. & h. Lower leaf cells and alar cells. Scales in mm: top = 0.05 (b,f,g,h); middle = 0.5 (c,d,e); bottom = 2.0 (a). Drawn from *Allen 16833* (MO).

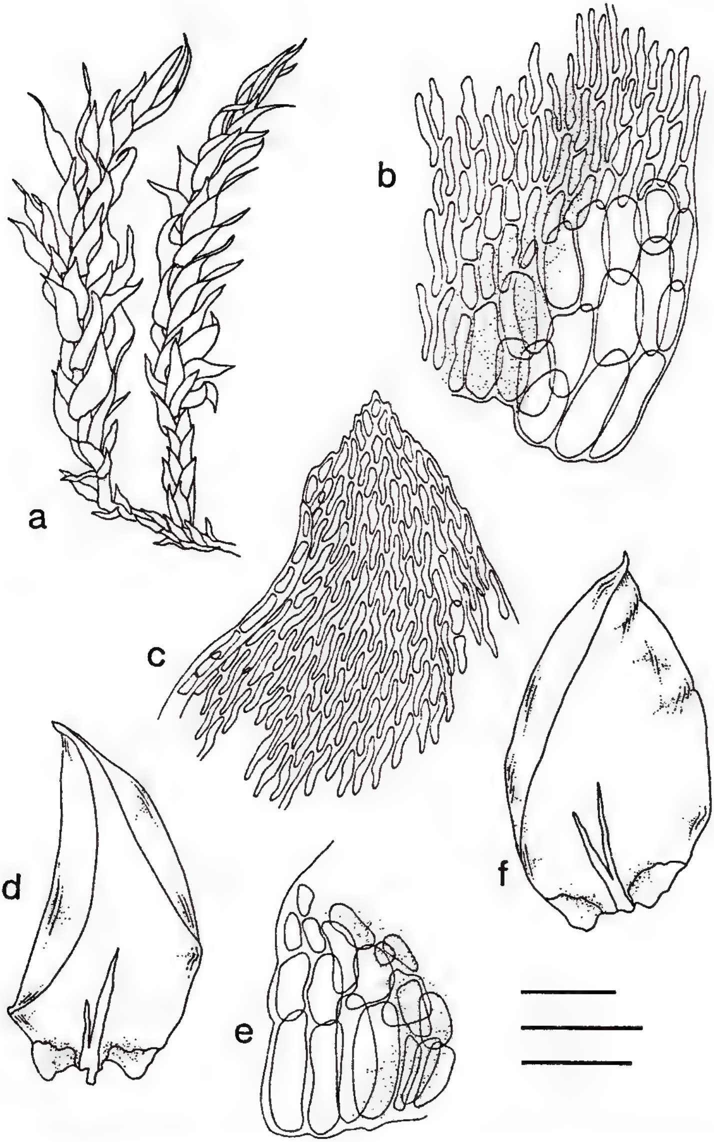

Plate 2. **Hygrohypnum eugyrium**. a. Habit. b. & e. Lower leaf cells and alar cells. c. Leaf apex. d. & f. leaves. Scales in mm: top = 0.05 (b,c,e); middle = 0.5 (d,f); bottom = 2.4 (a). Drawn from *Allen 16838* (MO).

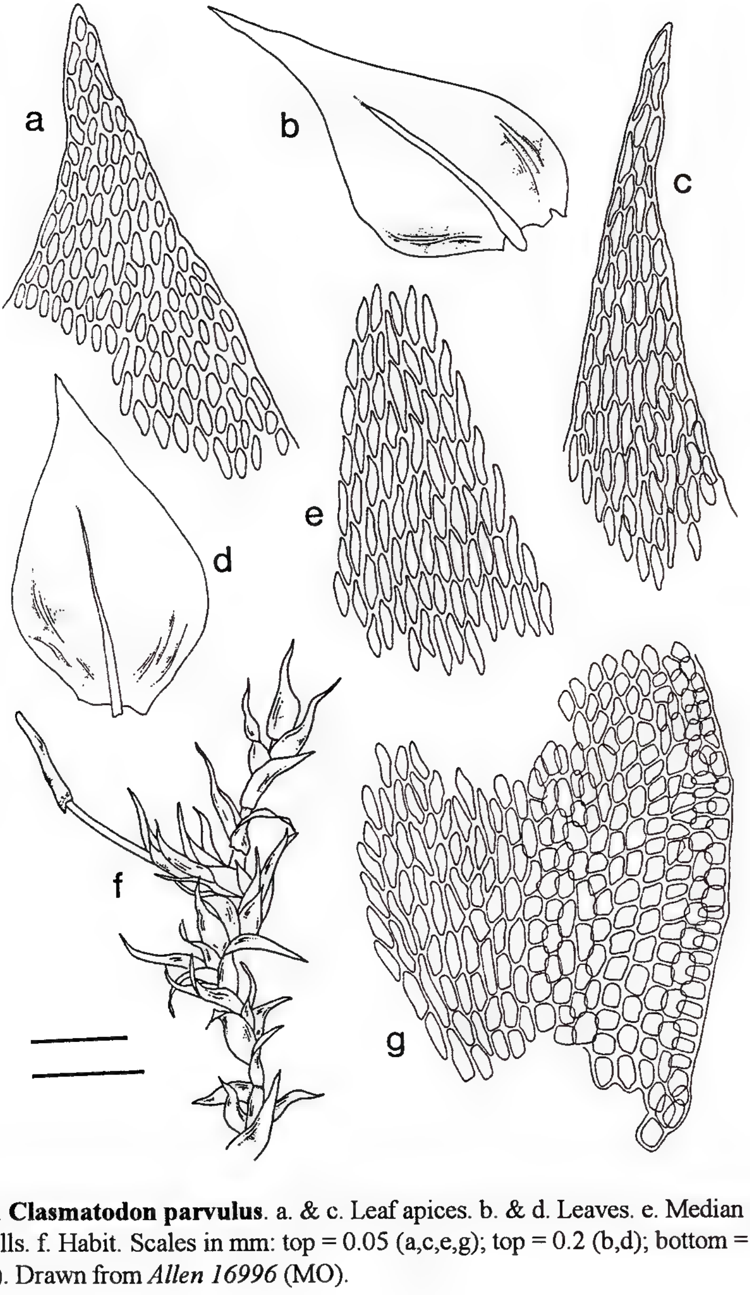

Plate 3. **Clasmatodon parvulus**. a. & c. Leaf apices. b. & d. Leaves. e. Median leaf cells. f. Habit. Scales in mm: top = 0.05 (a,c,e,g); top = 0.2 (b,d); bottom = 1.0 (f). Drawn from *Allen 16996* (MO).

*Clasmatodon parvulus*. Pennsylvania. Bucks County, Middletown Township, Green belt along Mill Creek between Snowball Gate and Red Rose Gate, Levittown, *Allen 16996* (MO).

This collection of *C. parvulus* (Fig. 3) lacks the julaceous aspect and closely imbricate leaves typical for the species. Instead the leaves are loosely erect-spreading to subsecund. Microscopically, both its vegetative and sporophytic features are characteristic for that species.

*Clasmatodon parvulus* is very common throughout the southeastern United States and the Interior Highlands region. The northern edge of the species range in eastern North America skirts southern Indiana along the Ohio River (Welch 1957) and southern Ohio (Snider 1992). It is also known from southern Maryland (Hermann 1959). The northernmost station for the species is in Warren county, northwestern New Jersey (Karlin & Schaffroth, 1992). The above Pennsylvania station is in southern Bucks county near the Delaware river. The only other mention of the species in Pennsylvania is by Grout (1934), who attributed Pennsylvania to the range of *C. parvulus* var. *rupestris* Sull. & Lesq.

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## ABLS meeting, 4-8 August 1996

The American Bryological and Lichenological Society is meeting in conjunction with the Bryological and Lichenological Section of BSA at the AIBS meeting in Seattle, Washington, 4-8 August 1996. Brent Mishler (bmishler@garnet.berkeley.edu), President-Elect of ABLS, and Paula DePriest (depriest@onyx.si.edu), Chair of the BSA Section, invite you to attend this meeting and present your latest research.

The focus of this year's meeting is "The Student," defined broadly to include graduate students, undergraduates, and amateurs. We want to make a special effort this year to attract all students interested in these organisms, to interact socially and scientifically, and thus to promote the future of the Society and the Section. To assist this effort, at the ABLS meeting last summer the membership voted to provide an extraordinary number of student travel awards. **For this meeting only, all duly registered graduate and undergraduate students that give presentations can receive $200 travel awards** (up to a $5000 cap -- if we have more requests than funds, the individual awards may be pro-rated to not exceed the $5000 maximum from ABLS). The Bryological and Lichenological Section of BSA will pool its allocated funds with those of ABLS to further support student travel awards. We plan to have special events focused on students, including a session on fund-raising with an NSF program director and a graduate student organized panel discussion on future trends and needs. We would welcome suggestions of other special events that would be of value.

Katie Glew and Judy Harpel have done a wonderful job designing a two-part bryophyte and lichen foray that will precede the meeting (described below). For social events we will have the traditional 7:00 Monday breakfast, and a Tuesday evening social. There will be a symposium on "The Regeneration Niche: Dispersal and Establishment of Bryophytes and Lichens" organized by R. Kimmerer and D. Vitt.

For further information about presenting a paper or poster, contact Brent Mishler (University and Jepson Herbaria, 1001 Valley Life Sciences Building, University of California, Berkeley, CA 94720-2465) for a title submission form and abstract form (abstracts were due to Mishler by March 1, 1996). If you wish to apply for a student travel award, please indicate so in a short letter accompanying the abstract, with some biographical information including your school, degree sought, and advisor. You will receive notification about travel awards in March. The A.J. Sharp award will again be given for the best student paper; if you wish to be considered for this please check item 11 on the title submission form.

This meeting promises to be an exciting one in all respects, and because of the focus on students it should be important to the future of our discipline. Please plan to come yourself and encourage all your students to attend.

## BRYOPHYTE AND LICHEN FIELD TRIP

### ABLS Foray, 2-4, 1996

August 2-3 will be a two day trip on the Olympic Peninsula. This trip will give the participants a chance to see North American Temperate Rain Forest systems as well as some of the drier areas within the Puget Sound. It will be limited to 35 people and reservations have been made at the Rosemary Inn on Lake Crescent. Total cost is $130.00, this includes the following: Accommodations, three meals (Friday dinner, Saturday breakfast, and sack lunch), the use of a conference room, ferry fees and transportation. Breakdown of the total price is: Accommodations: $40.00, with your own sleeping bag, or $10.00 extra for bedding. Transportation: $90 for the entire trip, plus to and from Seattle. The trip will begin and end at the dormitories on campus.

August 4 will be a one day trip to the central Cascades, with a chance to see both subalpine and alpine environments and the coniferous forests of Washington State. This trip will be limited to 45 people; it will begin and end at the dormitories on campus. Total cost is $40.00 and will include lunch.

You may register for either trip alone, or both, as you choose. As we will be going into areas that will require collecting permits these permits will be arrange ahead of time. Thus limited collecting will be allowed on both trips. Exsiccata collecting will not be allowed under the permit restrictions.

For more information please contact:
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phone: 206-685-2428 (lab), 206-725-0433 (home) fax: 206-684-1728
**Judy Harpel**, Botany Dept. Univ. of British Columbia, e-mail: harpel@clark.edu
phone: 604-822-3344 (lab), 360-254-6671 (home and work)

# ASC IS Moving

The Association of Systematics Collections (ASC) is an association of North American institutions that house systematics collections. ASC exists to promote systematics collections, the institutions responsible for them, and the biosystematics community for which they are an essential resource. ASC works toward these goals by providing representation to governmental agencies and policy makers, serving as a clearinghouse of information affecting the systematics community, organizing meetings and workshops, producing and distributing two regular newsletters and special publications, and interacting with other societies and groups both in North America and around the world. To learn more about ASC, and its current activities and projects, please contact the staff at the address below.

As of January 1, 1996 you may reach the ASC office at a new address:

Association of Systematics Collections
1725 K Street, NW
Suite 601
Washington, DC 20006-1401

Phone: (202) 835-9050
Fax: (202) 835-7334
e-mail: asc@ascoll.org
www: http://www.ascoll.org

Note: all individual e-mail addresses will remain the same.

# Eagle Hill Field Seminars, 1996

Eagle Hill Field Research Station will be offering a large number of seminars this summer and fall. Two of these of particular interest to *Evansia* subscribers.

## Mosses, Liverworts, and Sphagnum Mosses - June 9-15
**Instructor Dr. Norton G. Miller**

This seminar will provide a comprehensive overview of the field identification of mosses, liverworts, and peat mosses. Bryofloras of the predominant vegetation types of the region, including raised bogs, the coastal spruce-fir forest, and the mixed deciduous-conifer forest will be studied. Demonstrations and studies in the laboratory will focus on identification of specimens using microscopic features. A single habitat will be selected for intensive study, and a floristic inventory will be made by applying methods and procedures used in biological surveys.

## Lichens and Lichen Ecology - June 16-22
**Instructor Dr. David Richardson**

Lichens are unusually abundant and diverse along the coast of Maine. This seminar will emphasize field collection and observation of lichens. Laboratory studies will focus on identification of specimens with the use of reference books and keys. Lichens from open, forested, and seashore habitats will be collected. Emphasis will be on the larger macro lichens, but characteristic crustose species will also be studied. Lectures and slide presentations will cover the structure, reproduction, ecology, and physiology of lichens, as well as their use by man and their value for pollution monitoring.

For further information and a detailed brochure contact **Eagle Hill Field Research Station,** P.O. Box 9, Steuben, ME 04680-0009. Phone (207) 546-2821, Fax -3042, e-mail eaglhill@maine.maine.edu

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

*Evansia* is published with the aid of desktop publishing software and manuscripts should be submitted on computer diskette. The diskette must be IBM compatible (any size) with the author's name, manuscript file name, and word processing software indicated on the disk. Most word processing files can be converted with little effort however an ASCII copy of the file using the signs described below should be sent if you are not using a standard word processor or you convert from an Apple software.
Manuscripts may also be submitted over the Internet, available through university and research computing facilities. Manuscripts and correspondence may be sent to the e-mail address listed below. The word processed document should be UUENCODED if possible. After the manuscripts have been successfully received they will be acknowledged by e-mail. Please note that if you are sending ASCII text rather than UUENCODED document, a typed, original copy of the manuscript must also be sent to the Editor. At this time only some images can be extracted from diskette, thus a good quality copy of any illustration should also be mailed.

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**Manuscripts and diskettes should be sent to the Editor:**

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ISSN 0747-9859

*Evansia* volume 13, number 1 was mailed on 20 March 1996

# Checklist of the Mosses of Albany County, Wyoming

P. M. Eckel[1]

Albany County, in the southeastern corner of Wyoming, is very well collected due to the presence there of the University of Wyoming at Laramie and its Rocky Mountain Herbarium. Extensive exploration was made by Elias and Aven Nelson in the late 19th century, and later by C. L. Porter. Bryologists from Colorado and other states, particularly the late Fredrick Hermann, have made major collecting efforts in this county, and bryologists visiting the University have made local field trips in the county.

In a recently compiled list of the species and varieties of mosses that occur in Wyoming (Eckel, Great Basin Naturalist, in press), 316 taxa were counted. The 176 species and varieties that are noted below consitute about half of the known moss flora of the state.

Albany county lies in the Central Rocky Mountains, and includes portions of the Medicine Bow Mountains and its national forest. Elevations in the county range from over 6,000 feet to peaks, such as Laramie Peak to the north, at 10,274 ft.. The Snowy Range Pass in the southwestern section is at 10,800 ft. The Continental Divide occurs just to the west in Carbon County.

It has been popular to collect around the town of Centennial in the southwest section of the county and labels cite Centennial Valley, Centennial Hills, Antelope Basin with calcareous fens, *Populus*, *Betula* and *Salix* and *Penstemon*. The northwest base of Sheep Mountain, along WY Rte. 11 sports sandstone outcrops and chugwater redbeds with *Artemesia* scrub.

Names which occur on labels, often without reference to the locality being in Albany County include Pole and Sheep Mountain, Laramie Peak, Dale, Pole and Wood's Creeks, Libby Creek and its falls, La Plata Mines. Brooklyn and Mirror Lake, Lake Marie, Blair Camp, and Halleck and Plumbago Canyons, Long Canyon (supporting metamorphosed limestone rocks), Nash's Fork, Cummins, Antelope Basin, Homer Ranch, Hawk's Ranch on the Colorado-Wyoming State line, Fox Park (where there are sphagnous bogs), Keystone, Lincoln Gulch, Cooper Hill and Millbrook (Porter, 1925).

Specimens seen were at BUF, LAF, NY, NYS, RM, TENN and WTU. Doubtless there are other taxa and specimens of taxa in the herbaria of the various visitors to the county. It is hoped that this checklist will be an introduction to what is new and interesting on further visits to the area, in addition to being a guide to students studying these plants in the vicinity of Laramie. Nomenclature follows Anderson, et al. (1990).

---

[1] Buffalo Museum of Science, Buffalo, New York, 14211.

*Abietinellaa abietina* (Hedw.) Fleisch. (Porter 1935)
*Amblystegiuma serpens* (Hedw.) BSG. var. *serpens* (BUF, LAF, NY)
    var. *juratzkanum* (Schimp.) Rau & Herv. (RM)
*Amblystegium varium* (Hedw.) Lindb. (NY, RM)
*Amphidium lapponicum* (Hedw.) Schimp. (Porter 1935)
*Aulacomnium androgynum* (Hedw.) Schwaegr. (Porter 1935)
*Aulacomnium palustre* (Hedw.) Schwaegr. (RM, TENN)
*Barbula convoluta* Hedw. var. *convoluta* (RM)
*Barbula unguiculata* Hedw. (BUF, LAF)
*Bartramia ithyphylla* Brid. (RM)
*Brachythecium acutum* (Mitt.) Sull. (RM)
*Brachythecium collinum* (Schleich. *ex* C.Muell.) Schimp. *in* BSG (NY, NYS, RM)
*Brachythecium erythrorrhizon* Schimp. *in* BSG (NYS, RM)
*Brachythecium fendleri* (Sull.) Jaeg. (RM)
*Brachythecium frigidum* (C. Muell.) Besch. (NY, NYS)
*Brachythecium leibergii* Grout (NY)
*Brachythecium nelsonii* Grout (NYS, RM)
*Brachythecium oedipodium* (Mitt.) Jaeg. (RM)
*Brachythecium rivulare* Schimp. *in* BSG (NY, RM, US)
*Brachythecium rutabulum* (Hedw.) Schimp. *in* BSG. (NY)
*Brachythecium salebrosum* (Web. & Mohr) Schimp. *in* BSG. (Porter 1935)
*Brachythecium turgidum* (Hartm.) Kindb. (NY)
*Brachythecium velutinum* var. *venustum* (De Not.) Arc. (LAF, NYS)
*Bryoerythrophyllum recurvirostre* (Hedw.) Chen (RM)
*Bryum alpinum* Huds. *ex* With. (Porter 1935)
*Bryum algovicum* Sendtn. *ex* C. Muell. (RM)
*Bryum amblyodon* C. Muell. (Porter 1935)
*Bryum argenteum* Hedw. (NYS, RM)
*Bryum caespiticium* Hedw. (RM, US)
*Bryum capillare* Hedw. (RM, US)
*Bryum lisae* De Not. var. *cuspidatum* (Bruch & Schimp. *in* BSG) Marg. (RM, US)
*Bryum pallescens* Schleich. *ex* Schwaegr. (RM)
*Bryum pseudotriquetrum* (Hedw.) Gaertn., Meyer & Scherb. (RM, US)
*Bryum turbinatum* (Hedw.) Turn. (RM)
*Bryum weigelii* Spreng. *in* Biehler (Porter 1935)
*Calliergon giganteum* (Schimp.) Kindb. (NY, NYS, RM)
*Calliergon stramineum* (Brid.) Kindb. (RM)
*Campylium chrysophyllum* (Brid.) J. Lange (RM)

*Campylium hispidulum* (Brid.) Mitt. (NY)
*Campylium polygamum* (Schimp. *in* BSG) C. Jens. (RM)
*Campylium stellatum* (Hedw.) C. Jens. (RM)
*Ceratodon purpureus* (Hedw.) Brid. (RM)
*Cirriphyllum cirrosum* (Schwaegr. *in* Schultes) Grout (NY)
*Climacium americanum* Brid. (Porter 1935)
*Climacium dendroides* (Hedw.) Web. & Mohr. (RM)
*Conardia compacta* (C.Muell.) Robins. (NY, WTU)
*Coscinodon calyptratus* (Hook. *in* Drumm.) C. Jens. *ex* Kindb. (RM)
*Cratoneuron filicinum* (Hedw.) Spruce (NY)
*Cynodontium schisti* (Web. & Mohr) Lindb. (Porter 1937)
*Desmatodon cernuus* (Hueb.) Bruch & Schimp. *in* BSG (LAF, RM)
*Desmatodon heimii* (Hedw.) Mitt. (NY, NYS, RM)
*Desmatodon latifolius* (Hedw.) Brid. (TENN)
*Desmatodon porteri* James *in* Aust. (Porter 1937)
*Dichodontium olympicum* Ren. & Card. (RM)
*Dichodontium pellucidum* (Hedw.) Schimp. (NYS, RM)
*Dicranella schreberiana* (Hedw.) Hilf. *ex* Crum & Anderson (RM)
*Dicranella subulata* (Hedw.) Schimp. (RM)
*Dicranoweisia cirrata* (Hedw.) Lindb. *ex* Milde (Porter 1935)
*Dicranoweisia crispula* (Hedw.) Lindb. *ex* Milde (NYS, RM)
*Dicranum rhabdocarpum* Sull. (Porter 1935)
*Dicranum scoparium* Hedw. (Porter 1937)
*Didymodon rigidulus* Hedw. var. *rigidulus* (Porter 1937)
    var. *gracilis* (Schleich. *ex* Hook. & Grev.) Zand. (BUF, NY)
*Distichium capillaceum* (Hedw.) Bruch & Schimp. *in* BSG (BUF)
*Distichium inclinatum* (Hedw.) Bruch & Schimp. *in* B.S.G. (NY)
*Drepanocladus aduncus* (Hedw.) Warnst. var. *aduncus* (NY, RM)
    var. *kneiffii* (Schimp. *in* BSG) Moenk. (BUF, LAF, RM)
    var. *polycarpus* (Bland. *ex* Voit) Roth (NYS)
*Encalypta alpina* Sm. (Porter 1937)
*Encalypta procera* Bruch (Porter 1937)
*Encalypta rhaptocarpa* Schwaegr. (NY, NYS)
*Encalypta vulgaris* Hedw. (NY, NYS, RM)
*Eurhynchium pulchellum* (Hedw.) Jenn. var. *pulchellum* (NYS)
*Fissidens bryoides* Hedw. (RM, WTU)
*Fissidens obtusifolius* Wils. (NY)
*Fontinalis antipyretica* Hedw. var. *antipyretica* (RM, WTU)
    var. *gigantea* (Sull.) Sull. (RM)
    var. *oregonensis* Ren. & Card. (RM)
*Fontinalis hypnoides* C.J.Hartman (RM)

*Fontinalis neomexicana* Sull. & Lesq. (RM)
*Funaria hygrometrica* Hedw.
*Grimmia affinis* Hoppe & Hornsch. *ex* Hornsch (RM)
*Grimmia anodon* Bruch & Schimp. *in* BSG (LAF, NY, NYS, RM)
*Grimmia elatior* Bruch *ex* Bals. & De Not. (RM)
*Grimmia* laevigata (Brid.) Brid. (Porter 1935)
*Grimmia montana* Bruch & Schimp. *in* BSG (RM)
*Grimmia ovalis* (Hedw.) Lindb. (RM)
*Grimmia pulvinata* (Hedw.) Sm. (RM)
*Grimmia tenerrima* Ren. & Card. (RM)
*Grimmia trichophylla* Grev. (Porter 1937)
*Hymenostylium recurvirostre* (Hedw.) Dix. (WTU)
*Hedwigia ciliata* (Hedw.) P. Beauv. (Porter 1937)
*Helodium blandowii* (Web. & Mohr) Warnst. (RM)
*Homalothecium aeneum* (Mitt.) Lawt. (Porter 1937)
*Hygroamblystegium noterophilum* (Sull. & Lesq. *in* Sull.) Warnst. "Laramie" (RM); Albany Co., (Porter 1937)
*Hygroamblystegium tenax* (Hedw.) Jenn. (Porter 1937)
*Hygrohypnum luridum* (Hedw.) Jenn. (NY, RM)
*Hygrohypnum molle* (Hedw.) Loeske (WTU)
*Hygrohypnum ochraceum* (Turn. *ex* Wils.) Loeske. (Porter 1935)
*Hypnum cupressiforme* Hedw. var. *cupressiforme* (RM)
  var. *resupinatum* (Tayl.) Schimp. *in* Spruce (Porter, 1935, 1937)
*Hypnum lindbergii* Mitt. (RM)
*Hypnum pallescens* (Hedw.) P. Beauv. (RM)
*Hypnum revolutum* (Mitt.) Lindb. (LAF, RM)
*Hypnum vaucheri* Lesq. (LAF, NYS)
*Isopterygiopsis pulchella* (Hedw.) Iwats. (RM)
*Leptobryum pyriforme* (Hedw.) Wils. (NY, RM)
*Leptodictyum humile* (P. Beauv.) Ochyra (LAF, NYS, RM)
*Leptodictyum riparium* (Hedw.) Warnst. (NY)
*Meesia uliginosa* Hedw. (RM)
*Mnium ambiguum* C. Muell. (RM)
*Mnium arizonicum* Amann (BUF, RM)
*Mnium blyttii* Bruch & Schimp. *in* BSG (RM)
*Mnium marginatum* (With.) Brid. *ex* P. Beauv. (RM)
*Mnium thomsonii* Schimp. (RM)
*Myurella julacea* (Schwaegr.) Schimp. *in* BSG. (RM)
*Neckera pennata* Hedw. (RM)
*Oncophorus virens* (Hedw.) Brid. (RM)
*Orthotrichum affine* Brid. (Porter 1935)

*Orthotrichum alpestre* Hornsch. *in* BSG (NYS, RM)
*Orthotrichum anomalum* Hedw. (NY)
*Orthotrichum cupulatum* Brid. (NY)
*Orthotrichum hallii* Sull. & Lesq. *in* Sull. (BUF, LAF, RM)
*Orthotrichum pellucidum* Lindb. (NY)
*Orthotrichum rupestre* Schleich. *ex* Schwaegr. (RM)
*Palustriella commutata* (Brid.) Ochyra (Porter 1935)
*Palustriella decipiens* (De Not.) Ochyra (RM)
*Philonotis fontana* (Hedw.) Brid. var. *fontana* (RM)
    var. *americana* (Dism.) Flow. (RM)
    var. *caespitosa* (Jur.) Schimp. (RM)
*Physcomitrium hookeri* Hampe (RM)
*Plagiomnium ciliare* (C. Muell.) T. Kop. (RM)
*Plagiomnium cuspidatum* (Hedw.) T. Kop. (RM)
*Plagiomnium ellipticum* (Brid.) T. Kop. (RM)
*Plagiomnium rostratum* (Schrad.) T. Kop. (WTU)
*Plagiothecium denticulatum* (Hedw.) Schimp. *in* BSG (RM, WTU)
*Platydictya jungermannioides* (Brid.) Crum (NYS)
*Pohlia bolanderi* var. *seriata* Shaw. (RM)
*Pohlia cruda* (Hedw.) Lindb. (RM)
*Pohlia elongata* Hedw. (Porter 1935)
*Pohlia ludwigii* (Spreng. *ex* Schwaegr.) Broth. (RM)
*Pohlia nutans* (Hedw.) Lindb. (RM)
*Pohlia proligera* (Kindb. *ex* Breidl.) Lindb. *ex* Arnell (RM)
*Pohlia wahlenbergii* (Web. & Mohr) Andrews (BUF, LAF, RM)
*Polytrichastrum alpinum* (Hedw.) G.L. Smith. var. *alpinum* (RM)
*Polytrichum juniperinum* Hedw. (RM)
*Polytrichum lyallii* (Mitt.) Kindb. (Porter 1937)
*Polytrichum piliferum* Hedw. (RM)
*Polytrichum sexangulare* Brid. (RM)
*Polytrichum strictum* Brid.
*Pseudoleskea incurvata* (Hedw.) Loeske (Porter 1935)
*Pseudoleskea radicosa* (Mitt.) Macoun & Kindb. (RM)
*Pseudoleskeella tectorum* (Funck *ex* Brid.) Kindb. *in* Broth (NY, NYS)
*Pterygoneurum ovatum* (Hedw.) Dix. (NY)
*Pterygoneurum subsessile* (Brid.) Jur. (LAF, NY, NYS)
*Pylaisiella polyantha* (Hedw.) Grout (Porter 1935)
*Rhizomnium magnifolium* (Horik.) T. Kop. (RM)
*Rhizomnium pseudopunctatum* (Bruch & Schimp.) T. Kop. (RM)
*Rhytidium rugosum* (Hedw.) Kindb. (Porter 1935).
*Sanionia uncinata* (Hedw.) Loeske (NY, RM)

*Schistidium apocarpum* (Hedw.) Bruch & Schimp. *in* BSG (NY)
*Shistidium occidentale* (Lawt.) Churchill (RM)
*Schistidium rivulare* (Brid.) Podp. var. *rivulare* (RM)
*Schistidium tenerum* (Zett.) Nyh. (RM)
*Scouleria aquatica* Hook. *in* Drumm. (MO, NY, US)
*Sphagnum annulatum* H. Lindb. *ex* Warnst. (RM)
*Sphagnum fuscum* (Schimp.) Klinggr. (RM)
*Sphagnum russowii* Warnst. (RM)
*Timmia austriaca* Hedw. (RM)
*Timmia megapolitana* Hedw. var. *megapolitana* (RM)
  var. *bavarica* (Hessl.) Brid. (NYS, RM)
*Tomentypnum nitens* (Hedw.) Loeske (Porter 1935)
*Tortella fragilis* (Hook. & Wils. *in* Drumm.) Limpr. (LAF, NY, RM)
*Tortula caninervis* (Mitt.) Broth. (BUF, LAF, NY, NYS)
*Tortula inermis* (Brid.) Mont. (Porter 1935)
*Tortula mucronifolia* Schwaegr.
*Tortula norvegica* (Web.) Wahlenb. *ex* Lindb. (NYS, RM)
*Tortula ruralis* (Hedw.) Gaertn., Meyer & Scherb. (BUF, NYS)
*Warnstorfia exannulata* (Schimp. *in* BSG) Loeske var. *exannulatus* (LAF,RM)

## Problematical Taxa

*Encalypta contorta* Hoppe *ex* Lindb., reported for the county by Porter (1935) is *E. streptocarpa* Hedw. and is excluded from North America.

*Funaria flavicans* Michx. (Porter 1935) - probably not occurring as it is a taxon of the eastern United States.

*Hygrohypnum smithii* (Sw. *in* Lilj.) Broth. *in* Engl. & Prantl reported by Porter (1935, 1937) for this county is instead *H. luridum*.

*Orthotrichum speciosum* Nees *in* Sturm reported by Porter (1935) is unlikely, as this is a boreal species: no specimen was seen. A specimen at RM from Brooklyn Lake, identified as *Plagiothecium roseanum* BSG (now *P. cavifolium* (Brid.) Iwats.) *Elias Nelson 5242*, is *Isopterygiopsis pulchella*.

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# Macrolichens of the Blue Ridge Parkway in North Carolina

Karin Heiman[1]

Abstract. *The purpose of this study was to inventory the existing macrolichen flora of the Blue Ridge Parkway National Park in North Carolina and to establish baseline data for future comparison. A general species list was compiled, twenty-nine permanent arboreal transects were established and samples were collected for elemental analysis. More than two hundred taxa were identified, including many rare or unusual species (of which seven are state-listed and one is Federally listed). Data showed no strong tendencies for cover or diversity relative to elevation or geographic position or tree diameter. Different tree species substrates did show differences in lichen cover. General observations noted that lichens within the Asheville Basin were less diverse, less abundant and less robust. High elevations were diverse, yet undergoing changes as fir forests were being lost. Generally, older deciduous trees in a fairly open, stable forest conditions appeared to have the greatest abundance of corticulous lichens in this study.*

## Introduction

The Blue Ridge Parkway (BRP) is well known for its many occurrences of rare natural communities and species, and uncommon geologic features. The lichen flora of the Southern Appalachians is well known for its diversity (Dey, 1978). The topography, high rainfall and humidity, and continuous occupation of the area by plants through the Tertiary Era has promoted a pattern of endemism and disjunction in lichens and other organisms.

The Blue Ridge Mountains form the southeastern boundary of the Appalachian Mountain chain, containing the highest peaks in eastern North America (45 peaks over 6,000 feet in elevation). A wide variety of habitats and substrates exists.

Atmospheric conditions are constantly changing in the park. In the past, large changes likely occurred from logging, settlement of the area, American chestnut blight, and possibly automobile exhaust (since the park is centered on a heavily used roadway). Heavy logging across much of the land that is now managed by the BRP likely caused great changes in lichen substrate and flora. Compounds in auto exhaust have changed through time. As would be expected, Lawrey & Hale (1981) found a decrease in lead and an increase in sulfur compounds in lichen tissue in the Shenandoah Mountains, which is an area adjoining the BRP.

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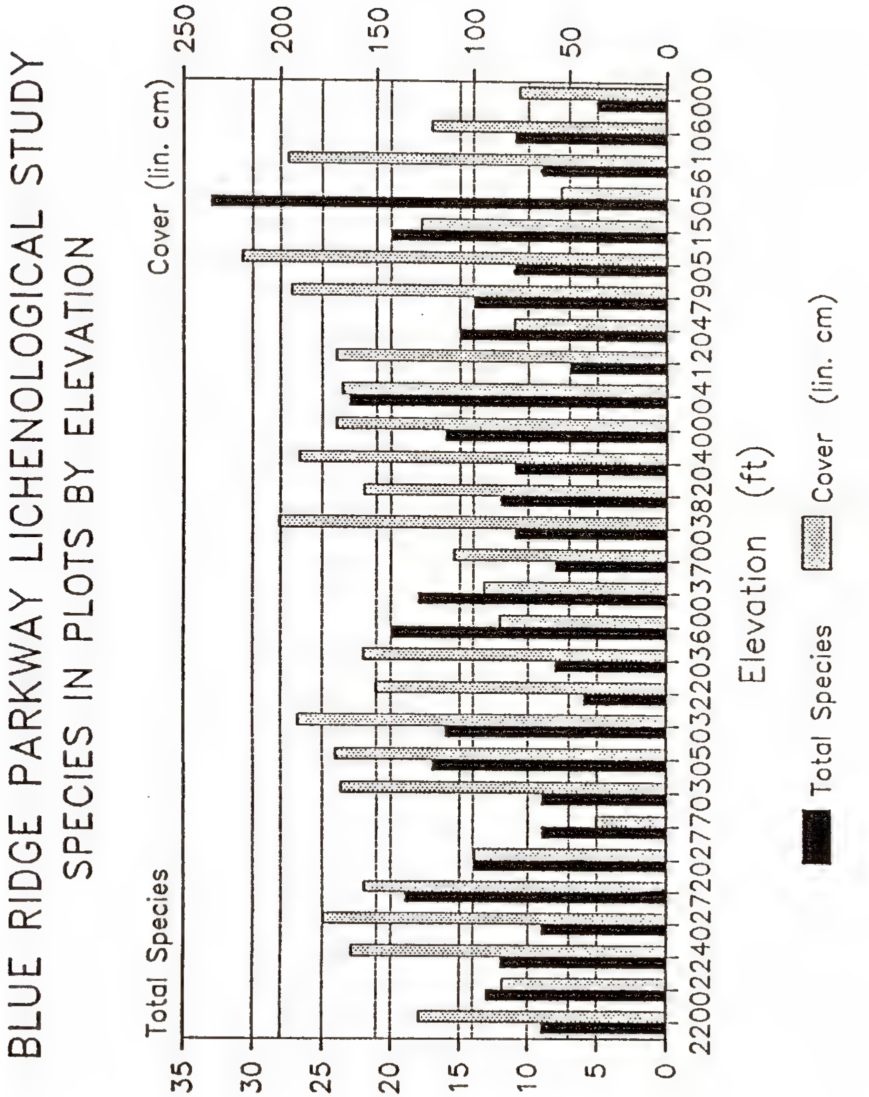
BLUE RIDGE PARKWAY LICHENOLOGICAL STUDY
SPECIES IN PLOTS BY ELEVATION
Total Species
Cover (lin. cm)
35
30
25
20
15
10
5
0
250
200
150
100
50
0
220022240272202277030305032220360037003820400041204790515056106000
Elevation (ft)
Total Species
Cover (lin. cm)

Figure I

Now, other changes are also in effect. Acid deposition has no doubt played a role in some of these changes. Research on Mt.. Mitchell (Bruck, 1988) has shown cloud acidity as low as pH 2.5. Massive mortality of fir trees (Abies fraseri), mainly due to the balsam woolly adelgid, has dramatically changed the Spruce-Fir ecosystems. This could well mean the loss of an important lichen substrate. In 1978, Dey wrote "The diversity and abundance of lichens on Abies is much greater than on Picea. Evidently physical characteristics...greatly reduce the ability of lichens to colonize and to persist on Picea as compared to their ability to live on the bark of Abies." Many other trees are now threatened by diseases such as oak decline, hemlock adelgid, and gypsy moth. In light of these changing conditions, it is even more crucial to get a record of the current lichen flora.

## Methods

General collections were made along the extent of the National Park Service land. Nomenclature follows Egan (1987). Identification was carried out by Yun Sil Park (especially the *Parmelia* groups), the author, and Philipe Clerc (for *Usnea*). Specimens were transfered to the Smithsonian Institute herbarium (US). Species range information was gained through Hale (1979), Weakley (1991), herbarium specimens, and other sources.

Plots were set up using 0.5 $M_2$ line intercept transects, each 1 M above ground, marked by stainless steel pins. Six trees were utilized at each sample point. Red oaks (*Quercus rubra*) were used when available, to standardize the plots. Cover measurements were recorded and photographs were taken at 1 M distances. Samples were taken for elemental analysis, however, no funds have been available for the analysis.

## Results

Numerous species were found that are either endemic to the southern Appalachians, globally rare, regionally uncommon or at the southern end of their range (see Appendix A). These include: *Gymnoderma lineare, Hydrothyria venosa, Xanthoparmelia monticola, Melanelia stygia, Cetraria arenaria, C. hepatizon, C. islandica, Cetraria culbersonii, Hypotrachyna virginica, H. rockii, H. gondylophora, H. laevigata, Parmotrema austrosinense, P. lousianae, P. margaritatum, Peltigera malacea, Physcia pseudospeciosa, Cladonia deformis, Everniastrum catawbiense, Punctelia appalachensis, Rimelia diffractaica, Stereocaulon dactylophyllum, S. paschale, Tuckermanopsis orbata, Umbilicaria caroliniana, U. polyphylla, Xanthoparmelia piedmontensis.*

The high elevation areas often had a high species diversity relative to their total lichen cover (see Figure I). High elevation locations often contained numerous occurrences of regionally uncommon species at the southern end of their range. Other

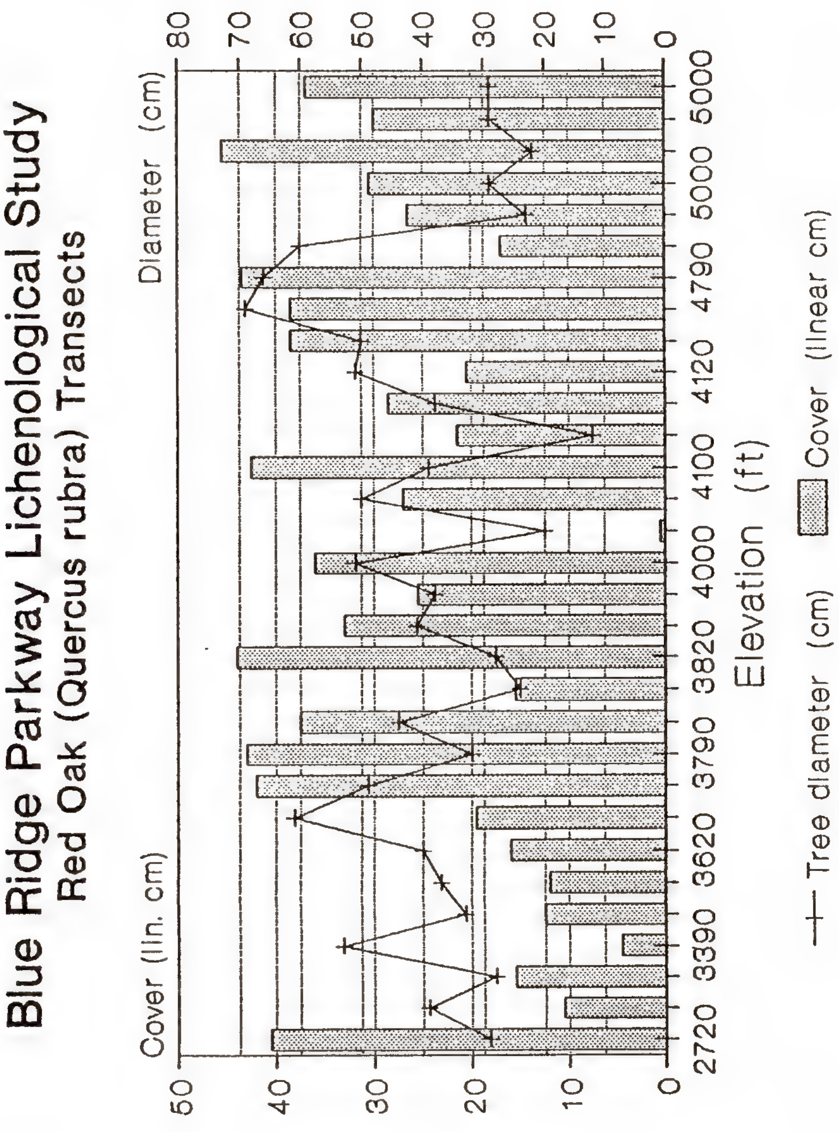
Blue Ridge Parkway Lichenological Study
Red Oak (Quercus rubra) Transects
Cover (lin. cm)
Diameter (cm)
0
10
20
30
40
50
0
10
20
30
40
50
60
70
80
2720
3390
3620
3790
3820
4000
4100
4120
4790
5000
5000
Elevation (ft)
Tree diameter (cm)
Cover (linear cm)

**Figure II**

concentrations of uncommon species were unpredicted, occurring at middle elevations. Cover data showed no clear trends in lichen cover (see Figure II) relative to elevational gradients. However, in the lower elevations a few tolerant species generally made up the cover. Few rare species were found. Many thalli showed signs of poor vigor.

Substrate was found to be an important variable in this study. Interesting correlations were found relative to substrate (see Figure III). Although the sample size is too low, certain tree species, such as sugar maple (*Acer saccharum*) and black walnut (*Juglans nigra*) appeared to have higher cover than most of the other species. American beech (*Fagus grandifolia*) appeared to have unusually high cover in the data. It is a smooth-barked species, which is usually difficult to colonize. Fraser fir (*Abies fraseri*) appeared to have lower cover than would have been expected, especially in light of Dey's studies (1978) mentioned above. The reason may well be that this study was done after the mature fir trees had died and the bark was starting to slough off. Although much lichen cover yet remained, it the lichen communities had already changed.

The few occurrences of *Lobaria scrobiculata* (Scop.) DC. were found only on very old trees (estimated at 150-300 years old). It may be hypothesized that this species, in this region, is associated with old growth forest conditions. Hale (1979) addresses this point: "Deforestation in the 19th century probably destroyed most of the habitats for this conspicuous lichen."

The Blue Ridge Parkway is a diverse and dynamic landmark. It is hoped that this study will prove to be a good management tool to monitor future changes in the lichen flora.

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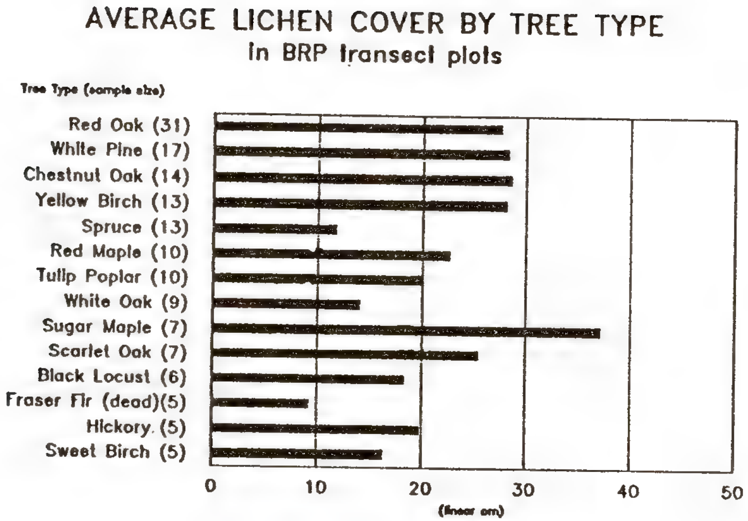

smaller sample size

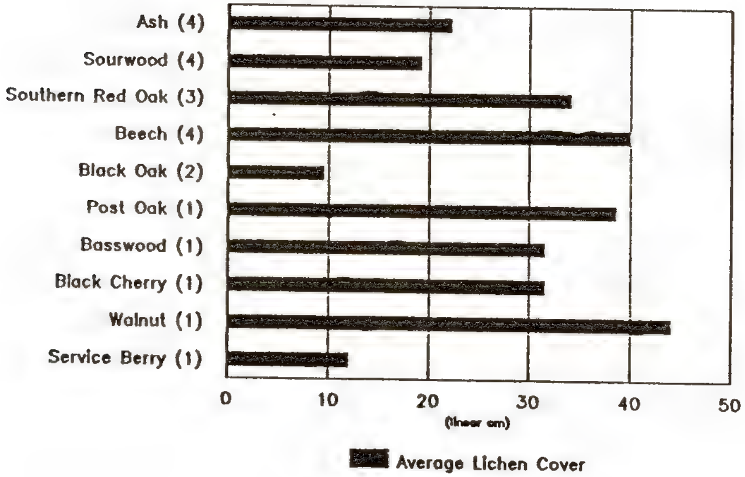

Figure III

## APPENDIX A. SPECIES LIST

| **Taxa** | **Collection Number** |
|---|---|
| *Anaptychia palmatula* (Michaux) Vainio | 390-16 |
| *Anzia colpodes* (Ach.) Stizenb. | 315-10 |
| *Baeomyces roseus* Pers. (Galloway 1980) | 422-12 |
| *Bryoria furcellata* (Fr.) Brodo & D. Hawksorth | 353-10 |
| *Candelaria concolor* (Dickson) B. Stein | 434-06 |
| *Candelaria fibrosa* (Fr.) Mull. Arg. | 418-14 |
| *Canoparmelia caroliniana* (Nyl.) Elix & Hale | 322-46 |
| *Canoparmelia crozalsiana* (B. de Lesd. ex Harm.) Elix & Hale | 217-09T |
| *Cetraria arenaria* Karnef. | 421-04 |
| *Cetraria culbersonii* Hale | 307-01 |
| *Cetrelia chicitae* (Culb.) Culb. & C. Culb. | 419-19T |
| *Cetrelia olivetorum* (Nyl.) Culb. & C. Culb. | 422-01 |
| *Cladina arbuscula* (Wallr.) Hale & Culb. | 380-15 |
| *Cladina rangiferina* (L.) Nyl. | 317-53b |
| *Cladina subtenuis* (des Abb.) Hale & Culb. | 431-22d |
| *Cladonia apodocarpa* Robb. | 327-12 |
| *Cladonia bacillaris* Nyl. | 387-13 |
| *Cladonia caespitica* (Pers.) Florke | 362-14 |
| *Cladonia caroliniana* Schwein. ex Tuck. | 310-15 |
| *Cladonia cervicornis* (Ach.) Flotow | 418-12 |
| *Cladonia chlorophaea* (Florke ex Sommerf.) Sprengel | 418-05 |
| *Cladonia coniocraea* auct. (fide Ahti) | 355-18T |
| *Cladonia cylindrica* (A. Evans) A. Evans | 317-27b |
| *Cladonia didyma* (Fee) Vainio | 362-00 |
| *Cladonia fimbriata* (L.) Fr. | 466-04b |
| *Cladonia furcata* (Huds.) Schrader | 467-10T |
| *Cladonia gracilis* (L.) Willd. | 434-08b |
| *Cladonia grayi* G. K. Merr. ex Sandst. | 379-19T |
| *Cladonia humilis* (With.) Laundon | 364-13 |
| *Cladonia macilenta* Hoffm. | 451-19b |
| *Cladonia mateocyantha* Robb. | 362-06 |
| *Cladonia peziziformis* (With.) Laundon | 379-27 |
| *Cladonia pleurota* (floerke) Schraerer | 394-03 |
| *Cladonia polycarpia* Nyl. | 466-04a |
| *Cladonia polycarpoides* Nyl. | 384-01 |
| *Cladonia pyxidata*(L.) Hoffm. | 459-06 |
| *Cladonia rei* Schraerer | 431-01T |
| *Cladonia squamosa* (Scop.) Hoffm. | 422-09 |
| *Cladonia turgida* Ehrh. ex Hoffm. | 234-00 |

| **Taxa** | **Collection Number** |
|---|---|
| *Collema flaccidum* (Ach.) Ach. | 347-12 |
| *Collema nigrescens* (Huds.) DC. | 225-12T |
| *Collema subflaccidum* Degel. | 422-05 |
| *Dermatocarpon luridum* (With.) Laundon | 317-03 |
| *Everniastrum catawbiense* (Degel.) Hale ex Sipman | 451-08 |
| *Flavoparmelia baltimorensis* (Gyelik & Foriss) Hale | 240-04b |
| *Flavoparmelia caperata* (L.) Hale | 407-25b |
| *Flavopuntelia flaventior* (Stirton) Hale | 217-13T |
| *Gymnoderma lineare* (A. Evans) Yoshim. & Sharp | N/A |
| *Heterodermia appalachensis* (Kurok.) Culb. | 320-23T |
| *Heterodermia casarettiana* (Massal.) Trevisan | 322-16 |
| *Heterodermia echinata* (Taylor) Culb. | 335-21T |
| *Heterodermia hypoleuca* (Muhl.) Trevisan | 335-22T |
| *Heterodermia leucomelos* (L.) Poelt | 459-09b |
| *Heterodermia obscurata* (Nyl.) Trevisan | 322-63 |
| *Heterodermia pseudospeciosa* (Kurok.) Culb. | 421-09 |
| *Heterodermia speciosa* (Wulfen) Trevisan | 322-13a |
| *Heterodermia squamulosa* (Degel.) Culb. | 419-03T |
| *Hypogymnia krogiae* Ohlsson | 424-65 |
| *Hypogymnia psysodes* (L.) Nyl. | 419-10 |
| *Hypotrachyna croceopustulata* (Kurok.) Hale | 424-80 |
| *Hypotrachyna cf. formosana* (Zahlbr.) Hale | 387-09T |
| *Hypotrachyna gondolyphora* (Hale) Hale | 434-02c |
| *Hypotrachyna imbricatula* (Zahlbr.) Hale | 424-02 |
| *Hypotrachyna laevigata* (Sm.) Hale | 307-09 |
| *Hypotrachyna livida* (Taylor) Hale | 322-26 |
| *Hypotrachyna oostingii* (Dey) Hale | 315-13b |
| *Hypotrachyna prolongata* (Kurok.) Hale | 451-47a |
| *Hypotrachyna revoluta* (Florke) Hale | 424-77 |
| *Hypotrachyna rockii* (Zahlbr.) Hale | 317-56a |
| *Hypotrachyna virginica* (Hale) Hale | 320-13T |
| *Imshaugia aleurites* (Ach.) S.F. Meyer | 389-04 |
| *Lasallia papulosa* (Ach.) Llano | 451-54 |
| *Leptogium austroamericanum* (Malme) Dodge | 379-21 |
| *Leptogium burnetiae* Dodge | 322-09 |
| *Leptogium corticola* (Taylor) Tuck. | 304-16T |
| *Leptogium cyanescens* (Rabenh.) Korber | 364-12 |
| *Leptogium laceroides* (B. de Lesd.) P. Jorg. | 434-07 |
| *Leptogium lichenoides* (L.) Zahlbr. | 347-14c |
| *Lobaria pulmonaria* (L.) Hoffm. | 390-11 |

| **Taxa** | **Collection Number** |
|---|---|
| *Lobaria quercizans* Michaux | 407-20 |
| *Lobaria scrobiculata* (Scop.) DC | N/A |
| *Melanelia exasperata* (De Not.) Essl. | 451-31 |
| *Melanelia halei* (Ahto) Essl. | 418-19 |
| *Melanelia stygia* (L.) Essl. | 364-17 |
| *Menegazzia terebrata* (Hoffm.) Massal. | 424-17 |
| *Nephroma helveticum* Ach. | 304-11T |
| *Pannaria conoplea* (Ach.) Bory | 466-10 |
| *Pannaria rubiginosa* (Ach.) Bory | 322-02 |
| *Pannaria taveresii* P.Jorg | 458-06 |
| *Parmelia omphalodes* (L.) Ach | 362-16 |
| *Parmelia saxatilis* (L.) Ach | 394-01 |
| *Parmelia squarrosa* Hale | 434-14 |
| *Parmelia sulcata* Taylor | 422-14 |
| *Parmeliella pannosa* (Swartz) Nyl. | 272-25 |
| *Parmeliella tryptophylla* (Ach.) Mull. Arg. | 268-00 |
| *Parmelina aurulenta* (Tuck.) Hale | 304-18 |
| *Parmelina galbina* (Ach.) Hale | 451-38 |
| *Parmelina horrescens* (Taylor) Hale | 424-77 |
| *Parmelina minarum* (Vainio) Skorepa | 407-08 |
| *Parmelina obsessa* (Ach.) Hale | 304-28 |
| *Parmotrema arnoldii* (Du Rietz) Hale | 322-75 |
| *Parmotrema austrosinense* (Zahlbr.) Hale | 451-22 |
| *Parmotrema cetratum* (Ach.)Hale | 315-06 |
| *Parmotrema chinense* (Osbeck) Hale & Ahti | 320-32 |
| *Parmotrema crinitum* (Ach.) M. Choisy | 322-03 |
| *Parmotrema hypotropum* (Nyl.) Hale | 390-20 |
| *Parmotrema margaritatum* (Hue) Hale | 241-03 |
| *Parmotrema mellissii* (Dodge) Hale | 424-73 |
| *Parmotrema michauxianum* (Zahlbr.) Hale | 389-09 |
| *Parmotrema* cf. *neotropicum* Kurok ex. Hale | 288-00 |
| *Parmotrema perforatum* (Jacq.) Massal. | 325-04T |
| *Parmotrema reticulatum* (Taylor) M. Choisy | 379-15 |
| *Parmotrema stuppeum* (Taylor) Hale | 327-03 |
| *Parmotrema subisidiosum* (Mull. Arg.) Hale | 240-06 |
| *Parmotrema subtinctorium* (Zahlbr.) Hale | 320-31 |
| *Parmotrema tinctorum* (Delise ex Nyl.) Hale | 389-16 |
| *Parmotrema ultraluscens* (Krog) Hale | 219-04c |
| *Peltigera canina* (L.) Willd. | 310-10 |
| *Peltigera horizontalis* (Huds.) Baumg. | 319-12 |

| **Taxa** | **Collection Number** |
|---|---|
| *Peltigera leucophlebia* (Nyl.) Gyelnik | 258-00 |
| *Peltigera malacea* (Ach.) Funck | 431-22c |
| *Peltigera polydactyla* (Necker) Hoffm. | 421-04 |
| *Phaeophyscia adiastola* (Essl.) Essl. | 353-20 |
| *Phaeophyscia cf. erythrocardia* (Tuck.) Essl. | 322-59 |
| *Phaeophyscia cf. imbricata* (Vain.) Essl. | 353-19 |
| *Phaeophyscia orbicularis* (Necker) Moberg | 458-10 |
| *Phaeophyscia pusilloides* (Zahlbr.) Essl. | 304-15 |
| *Phaeophyscia rubropulchra* (Degel.) Moberg | 217-07T |
| *Physcia cf. adscendens* (Fr.) H. Oliver | 394-10 |
| *Physcia aipolia* (Ehrh. ex Humb.) Furnr. | 317-57 |
| *Physcia americana* G.K. Merr. in A. Evans & Meyrow | 330-01 |
| *Physcia millegrana* Degel | 390-44 |
| *Physcia phaea* (Tuck.) Thomson | 418-04 |
| *Physcia pseudospeciosa* Thomson | 317-55 |
| *Physcia stellaris* (L.) Nyl. | 422-33 |
| *Physcia subtilis* Degel. | 418-16 |
| *Physconia detersa* (Nyl.) Poelt | 317-30 |
| *Platismatia tuckermanii* (Oakes) Culb. & C. Culb. | 320-14 |
| *Pseudevernia cladonia* (Tuck.) Hale & Culb. | 424-52 |
| *Pseudevernia consocians* (Vainio) Hale & Culb. | 421-13 |
| *Pseudocyphellaria aurata* (Ach.) Vain | 459-08 |
| *Punctelia appalachensis* (Culb.) Krog | 310-21 |
| *Punctelia cf. bolliana* (Mull. Arg.) Krog | 260-08T |
| *Punctelia rudecta* (Ach.) Krog | 320-30 |
| *Punctelia subrudecta* (Nyl.) Krog | 390-43 |
| *Pycnothelia papillaria* Dufour | 242-09 |
| *Pyxine caesiopruinosa* (Nyl.) Imsh. | 335-09T |
| *Pyxine sorediata* (Ach.) Mont. | 272-02 |
| *Ramalina americana* Hale | 451-64 |
| *Ramalina intermedia* (Delise ex Nyl.) Nyl. | 304-22 |
| *Stereocaulon dactylophyllum* Florke | 431-22 |
| *Stereocaulon paschale* (L.) Hoffm. | 424-27 |
| *Stereocaulon pileatum* Ach. | 451-68 |
| *Stereocaulon saxatile* Magnusson | 422-08 |
| *Sticta fuliginosa* (Hoffm.) Ach. | 407-22 |
| *Sticta limbata* (Sm.) Ach. | 459-01T |
| *Sticta weigelii* (Ach.) Vainio | 353-23 |
| *Tuckermannopsis americana* (Sprengel) Hale | 379-11 |

| **Taxa** | **Collection Number** |
|---|---|
| *Tuckermannopsis aurescens* (Tuck.) Hale | 225-02 |
| *Tuckermannopsis ciliaris* (Ach.) Gylnik | 320-12 |
| *Tuckermannopsis oakesiana* (Tuck.) Hale | 263-00 |
| *Tuckermannopsis orbata* (Nyl.)Lai | 424-19 |
| *Tuckermannopsis pinastri* (Scop.) Hale | 322-23b |
| *Tuckermannopsis viridis* (Schwein. in Halsey) Hale | 389-17 |
| *Umbilicaria caroliniana* Tuck. | 175-00 |
| *Umbilicaria mammulata* (Ach.) Tuck. | 304-21 |
| *Umbilicaria muehlenbergii* (Ach.) Tuck | 242-11 |
| *Umbilicaria polyphylla* (L.) Baumg. | 421-02 |
| *Umbilicaria vellea* (L.) Ach. | 353-35 |
| *Usnea herrei* Hale | N/A |
| *Usnea mutabilis* Stirton | N/A |
| *Usnea rubicunda* Stirton | N/A |
| *Usnea strigosa* (Ach.) A. Eaton | 407-10b |
| *Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale | 240-11 |
| *Xanthoparmelia hypopsila* (Mull. Arg) Hale | 270-00 |
| *Xanthoparmelia monticola* (Dey) Hale | 242-10a |
| *Xanthoparmelia piedmontensis* (Hale) Hale | 422-17 |
| *Xanthoparmelia plittii* (Gyelnik ex D.Dietr) Hale | 219-01 |
| *Xanthoparmelia subramigera* (Gyelnik) Hale | 242-08a |
| *Xanthoparmelia taractica* (Krempelh.) Hale | 240-10 |
| *Xanthoparmelia tasmanica* (J.D.Hook & Taylor) Hale | 434-03 |
| *Xanthoria sorediata* (Vainio) Poelt | N/A |

# *Hypnum plicatulum* (Hypnaceae: Musci) in Maine

Bruce Allen[1]

*Hypnum plicatulum* (Lindb.) Jaeg. is a boreal species first described from the Amur region of the Russian Far East (Lindberg 1872). Ando (1972) gives the range of the species in Asia as the Ural Mountains of Russia across Siberia and southward to the subalpine or alpine zones of Korea and Japan. In North America it is known from Alaska, Yukon, Northwest Territories (western Mackenzie District, Baffin Island, Queen Elizabeth Islands), the northern parts of British Columbia, Manitoba, Ontario, and Quebec, Nova Scotia, New Brunswick, Newfoundland, Labrador, and southern Greenland (Schofield 1992). *Hypnum plicatulum* has never been reported south of the Canadian border, although Ando (1972) included northern New England in his distribution map of the species. Indeed, a northern New England distribution for the species seems likely since Schofield (1992) considered the species "relatively frequent in Nova Scotia" and also included New Brunswick in its range. *Hypnum plicatulum* might even be found in northern Minnesota near the western shore of Lake Superior based upon its presence in the Thunder Bay region of Ontario. It is therefore not surprising that an examination of the Maine specimens of *Hypnum* at NY revealed several collections of *H. plicatulum* (Fig. 1). Since most of the NY collections of *H. plicatulum* were originally determined as *H. fertile* Sendtn., I re-examined the collections of that species in MO and found other Maine collections of *H. plicatulum*. The species is now known from eight localities in Maine: **Aroostook Co.**: Portage, *Riddle* (NY); **Franklin Co.**: Rangeley, *Norton 9375* (NY), Tumbledown Mountain, *Pursell 11135* (MO); **Hancock Co.**: Pemetic Mountain, *Davis* (MO); **Oxford Co.**: Norway, *Bacon 27* (NY); **Sagadahoc Co.**: Reid State Park, *Allen 16610* (MO); **Washington Co.**: St. Croix River, *Harvey* (NY), Roque Bluff, *Knowlton* (NY).

*Hypnum plicatulum* is a small species of *Hypnum* with a field-aspect much like *Ctenidium*. It is one of six species in the section *Hamulosa* B.S.G (Ando 1972), which is characterized by small to medium sized, autoicous, dioicous or phyllodioicous plants that have a well developed stem hyalodermis and plicate perichaetial leaves. Three species of section *Hamulosa* occur in eastern North America: *H. plicatulum*, *H. hamulosum* and *H. callichroum*. Persson (1947) used the auriculate stem leaves of *H. plicatulum* to distinguish it from the other two and this appears to adequately distinguish it from *H. hamulosum*. Schofield (1992), however, attributed auriculate leaves to both *H. plicatulum* and *H. callichroum*. The two species differ fundamentally in their alar regions; *Hypnum callichroum* has numerous, thin-walled and enlarged alar cells while *H. plicatulum* has a few, small, subquadrate alar cells displaced away from the leaf margin and close to the stem.

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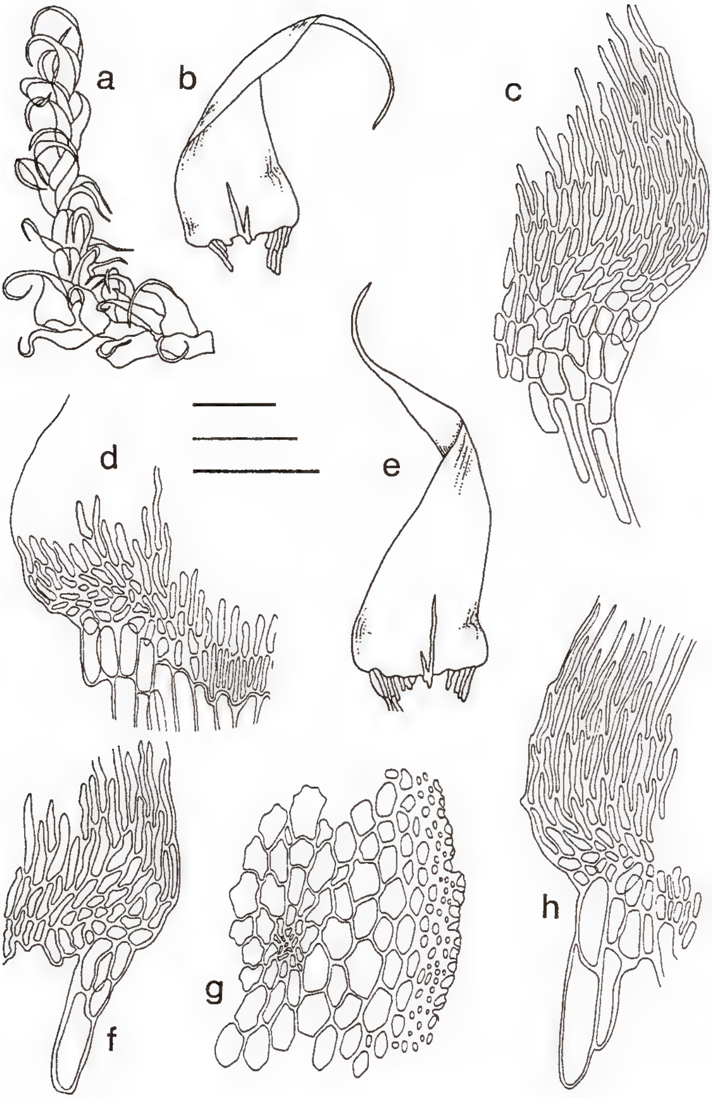

Figure 1. *Hypnum plicatulum*. a. Habit. b. & e. Stem leaves. c., d., f, & h. Leaf bases. g. Stem cross-section. Scales in mm: Top = 0.05 (c,d,f--h); middle = 1.17 (a); bottom = 0.5 (b,e).

*Hypnum curvifolium* Hedw. and *H. fertile* are two other eastern North American species that have been confused with *H. plicatulum*. Both *H. curvifolium* and *H. plicatulum* have auriculate leaves, but *H. curvifolium* lacks a stem hyalodermis and its leaves end in a short, broad acumen (Fig. 2). The separation of *H. fertile* from *H. plicatulum* is more difficult.

*Hypnum fertile* (Fig. 3) belongs to section *Fertilia* Ando, a section of medium to large sized, autoicous plants, that have a poorly developed stem hyalodermis, plicate perichaetial leaves and stem leaves with an alar region consisting of heterogeneous cells. Both Ando (1973) and Schofield (1992) treated the stems of section *Fertilia* as being not strictly hyalodermis, and this is true to some extent. The epidermal cells in *H. fertile* are never as fully enlarged as can be found, for example, in *H. lindbergii* Mitt.; they are however consistently enlarged and relatively thin-walled when compared to species of the "non-hylodermis"-sections of *Hypnum*. On the other hand, some species in the "hylodermis"-sections (i.e., *Pratensia* B.S.G. and *Hamulosa*) don't always exhibit a fully developed hylodermis. In fact the feature seems to be variable within single collections of some species. Due to the variable nature of the hyalodermis in those sections that have one the species of section *Fertilia* are best treated as members of the "hyalodermis"-group of species.

Although placed in different sections (Ando 1973), the separation of *H. plicatulum* from *H. fertile* depends upon a detailed examination and evaluation of three features: stem leaf shape at base, stem leaf alar cell development, and sexuality. In *H. plicatulum* most stem leaves are auriculate at base, however, they also can be simply rounded to the insertion and often leaves stripped from single stems have both types of leaves. In contrast the stem leaves of *H. fertile* can be rounded or straight to the insertion, with both types of leaves occurring on single stems. Since both species can have leaves rounded to the insertion, it is necessary to examine numerous stem leaves, looking for either auriculate or straight sided leaves.

The alar cells of *H. plicatulum* generally consist of a few small, thick-walled subquadrate to rectangular cells that are positioned away from the leaf margin due to the leaf base auriculation. When the leaves are simply rounded to the insertion the alar cells are not displaced, and occur along the basal margin (Fig. 1c). Often there are a few enlarged, inflated cells at the very base of the leaf, these cells however appear to be stem hyalodermal cells rather than alar cells. In contrast the alar cells of *H. fertile* consist of an excavate group of enlarged, thin-walled, hyaline cells at the base of the leaf above which are a few small, irregularly subquadrate cells along the basal margin. Leaves of *H. plicatulum* that are rounded to the insertion and have alar cells along the basal margin are very similar to some leaves of *H. fertile*.

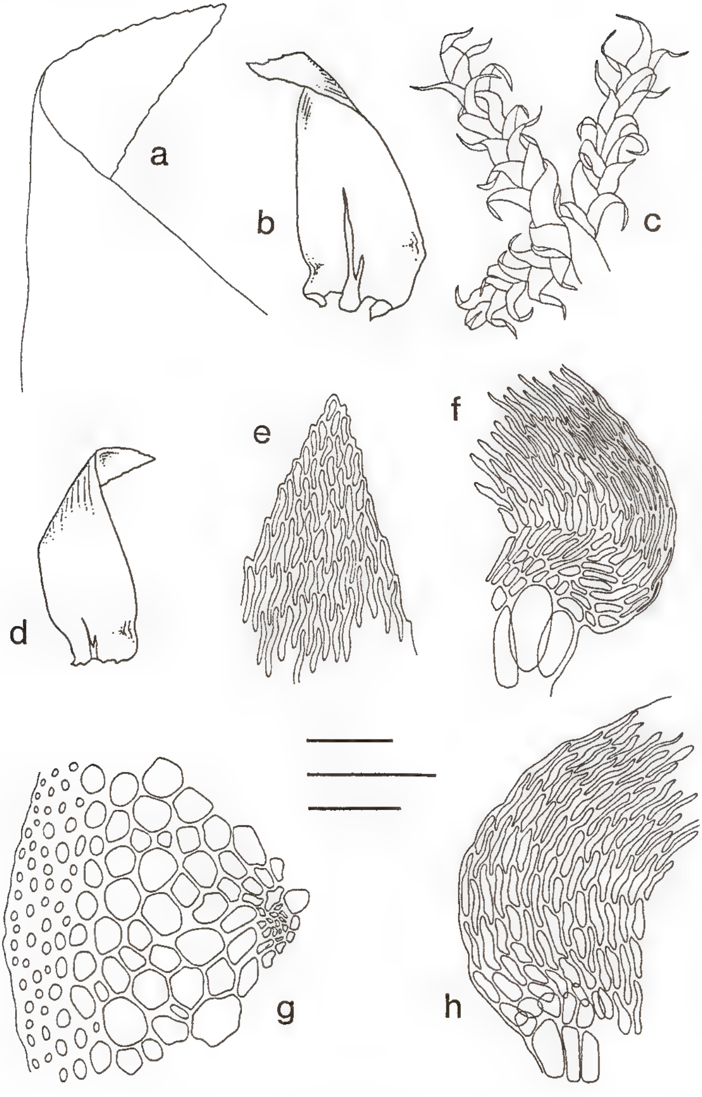

Figure 2. *Hypnum curvifolium*. a. Leaf apex. b. & d. Stem leaves. c. Habit. e. Leaf apex. f. & h. Leaf bases. g. Stem cross-section. Scales in mm: Top = 0.05 (e--g); top = 0.1 (a); middle = 0.5 (b. & d.); bottom = 1.0 (c) .

Plants of *H. fertile* are autoicous with perigonia occurring very near the perichaetia on the same stem. Lindberg (1872) and Grout (1932) reported the sexuality of *H. plicatulum* as dioicous, however, Noguchi (1994) considered the species phyllodioicous. Most of the collections of *H. plicatulum* I examined consisted of plants with only perichaetia. In one collection, however, dwarf males were also found thus confirming the phyllodioicous condition reported by Noguchi for *H. plicatulum*.

### Key to eleven *Hypnum* species reported from Maine.

1. Stem epidermal cells enlarged, thin-walled and hyaline . . . . . . . . . . . . . . . . 2.
1. Stem epidermal cells not noticeably enlarged, thin-walled or hyaline . . . . . . . 7.
    2. Plants growing in wet or swampy habitats, with few branches, never pinnate; leaves acute to broadly acuminate; alar cells conspicuously enlarged or inflated . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3.
    2. Plants growing in drier habitats, usually regularly pinnate; leaves filiform-acuminate; alar cells irregularly quadrate or with a few oblong, inflated and hyaline cells at basal angles bordered above by small, subquadrate cells . . . . . . . . . . . . . . . . . . . . . . . . . . . . 4.
3. Leaves auriculate; alar cells gradually enlarged . . . . . . . . . . . . . . **H. pratense**
3. Leaves not auriculate; alar cells abruptly inflated and enlarged . **H. lindbergii**
    4. Stem leaves auriculate or rounded to the insertion . . . . . . . . . . . . . 5.
    4. Stem leaves rounded or straight to the insertion . . . . . . . . . . . . . . . 6.
5. Alar cells thin-walled, enlarged, oblong at base, bordered above and near the margin by a few small, firm-walled, subquadrate cells . **H. callichroum**
5. Alar cells thick-walled throughout, with a few, small, subquadrate cells usually displaced away from the leaf margin and close to the stem **H. plicatulum**
    6. Alar cells scarcely differentiated or consisting of a few, small, subquadrate cells with 1-2 larger, hyaline cells at the extreme angles . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. hamulosum**
    6. Alar cells consisting of an excavate basal group of enlarged, thin-walled, hyaline cells bordered above by a few small, irregularly subquadrate cells . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. fertile**
7. Stem leaves auriculate, alar cells consisting of a few hyaline, thin-walled, inflated cells forming short decurrencies and bordered above by a few short-oblong to subquadrate cells . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. curvifolium**
7. Stem leaves not auriculate; alar cells thick-walled throughout . . . . . . . . . . . 8.
    8. Plants robust; pseudoparaphyllia foliose, deeply incised; alar cells enlarged, hyaline to orange below, smaller and opaque above . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. imponens**
    8. Plants small to medium-sized; pseudoparaphyllia filamentous to lanceolate; alar cells opaque, transversely elongate or equal sized throughout . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9.

9. Autoicous; leaf margins reflexed below, serrulate to serrate throughout
 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. pallescens**

9. Dioicous; leaf margins plane to erect, entire or serrulate toward the apex . . 10.

    10. Capsules erect to suberect, symmetric; operculum conic-mamillate
 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. mammillatum**

    10. Capsules arcuate, asymmetric, operculum conic-rostrate
 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **H. cupressiforme**

**Acknowlegments.** I thank the William Campbell Steere Fund for the financial support that made possible my visit to NY, the New York Botanical Garden for the loan of its Maine moss collections, and William R. Buck for his continued support and help with the Maine moss flora project.

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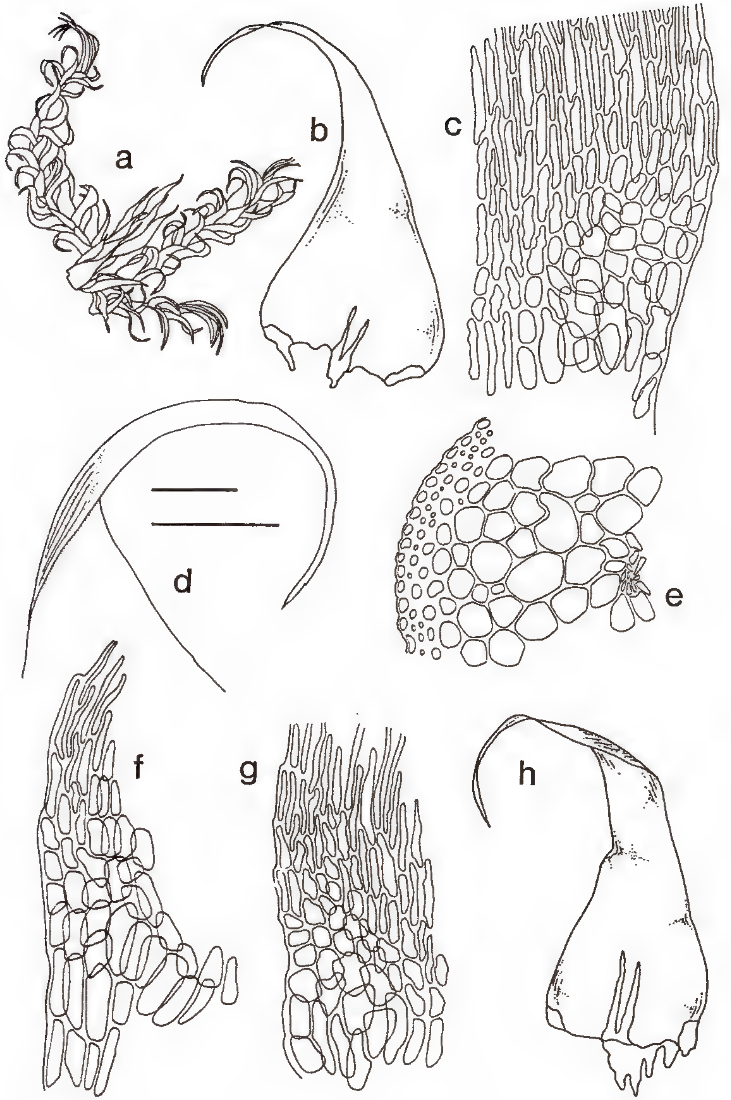

Figure 3. *Hypnum fertile*. a. Habit. b. & h. Stem leaves. c., f. & g. Leaf bases. d. Leaf apex. e. Stem cross-section. Scales in mm: Top = 0.05 (c, e, f & g); top = 0.1 (d); top = 1.0 (a); bottom = 0.5 (b & h).

# Micarea botryoides new to North America

Bruce McCune[1]

*Micarea botryoides* (Nyl.) Coppins is one of a few species of *Micarea* that have stalked pycnidia (Coppins 1983, Purvis et al. 1992). It has a dark green or blackish green, granular thallus (similar to *Micarea prasina* Fr.), but is distinguished from that species by distinctly stalked, black pycnidia, black apothecia, and a brown hypothecium.

*M. botryoides* was found in two conifer forests at low elevations in western Oregon and Washington. While the Oregon population was abundantly fertile, no apothecia were found in the Washington population.

The species has previously been reported from Scandinavia, Europe, and the Azores (Purvis et al. 1992; Santesson 1993). In Great Britain it grows on rotten wood, tree bases, and beneath overhangs on rock, roots, soil, and bryophytes. It is pollution tolerant (Purvis et al. 1992).

The Oregon site is a second-growth conifer forest about 80 years old. *Micarea botryoides* was found on a snag of an earlier generation of very large *Pseudotsuga*. The bases of other old snags in the area were dominated by *M. prasina*. The site has now been clearcut, so after a few years we should be able to assess whether *M. botryoides* survives the drastic change in environment.

The site in Washington is an old-growth forest. *Micarea botryoides* was found on the rotten, charred bark on the base of a very large, live *Pseudotsuga*. This forest experiences air pollution from the Seattle-Tacoma area, as evidenced by the near-absence of cyanolichens and the scarcity of alectorioid lichens. Associates included *Micarea prasina*, *Trapeliopsis pseudogranulosa* Coppins & P. James, and *Lecanactis megaspora* (G. Merr.) Brodo (= *L. abietina* according to some authors).

## Specimens

USA: OREGON: Benton County, Flat Mountain, Coast Range, 23 km SW of Corvallis, 44°26'N 123°28'W, 680 m, on rotten snag, *McCune 22442* (OSC, E). WASHINGTON: Pierce County, old-growth *Pseudotsuga - Thuja plicata* forest, Pack Experimental Forest, foothills of Cascade Range near town of La Grande, 46°30'N 121°16'W, 460 m, on base of *Thuja*, *McCune 23039* (OSC).

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**Acknowledgements.** I thank Brian Coppins for verifying the specimen from Oregon and Abbey Rosso for a critique of the manuscript.

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## Mosses and Liverworts of Hong Kong

Do you know how many species of bryophytes there are in 1000 square km of a subtropical area? In the recently published *Mosses and Liverworts of Hong Kong*, Dr. May-Ling described and photographed 156 species. Each page includes three colour photographs of habits and close-up views of leaves and capsules. Descriptions of the habit, stem, leaves, and sporophyte are included. Many species are new records for Hong Kong.

Price: US$30 (postage by air included). A special, 20% off discount (US$24) is available for ABLS members with North American addresses. Other discounts are available for multiple copies (10%/20% off for 5/10 copies or more respectively. For individuals in developing countries and some Eastern European countries 30% off discounts are available. Please send order with payment (checks payable to "May-Ling So") for prompt delivery to Joseph Kwok-leung Yip, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006 (e-mail yipkl@ucunix.san.uc.edu). Orders can also be sent with payment to Dr. So, Biology Department, Hong Kong Baptist University, 224 Waterloo Road, Hong Kong (Tel.: (852) 2336-1400; FAX (852) 2339-7052).

# Checklist of bryophytes occurring in Hubbard Brook Experimental Forest

Natalie L. Cleavitt & Timothy J. Fahey[1]

A total of 176 species of bryophytes were found in Hubbard Brook Experimental Forest (HBEF) during detailed surveys in 1994 and 1995. *Pohlia lescuriana* and *Tetraplodon angustatus* are reported as new records for the state of New Hampshire. HBEF is located in north-central New Hampshire (43°56'N, 71°45'W) in the White Mountain National Forest, and has been part of an intensive ecosytem study since 1963 (Likens 1985). The ecology, hydrology, and biogeochemistry at HBEF have been described in detail and have added to the fundamental knowledge of forest ecosystems (see Bormann & Likens 1979; Likens 1985). However, little work on bryophytes has been conducted at HBEF, although, Bowden (1991) has studied the role of *Polytrichum* in the nitrogen cycle of successional ecosytems at HBEF.

Hubbard Brook Experimental Forest covers 3,076 ha of the Hubbard Brook valley with an elevation range from 245 m at the lower boundary of HBEF to 1,015 m at the summit of Mt. Kineo. HBEF experiences average annual temperatures around 6.6°C with average annual precipitation of 115 cm and around 239 cm of snowfall. Hubbard Brook is a fourth-order stream which flows 10 km in a generally east-west orientation. The underlying geology is primarily the Littleton formation composed of highly metamorphosed sandstone and mudstone (Likens 1985). In the western half of HBEF, an intrusion of Kinsman quartz monzonite dominates with occasional basalt dikes. Soil depth varies greatly from the deepest deposits in the valley and floodplain to the rocky ridgeline with a scanty covering of organic material. The soils are quite heterogeneous, but acid spodosols with a rich organic horizon dominate (pH about 4.5) (Likens 1985).

The forest is predominantly composed of mature northern hardwoods. It was logged in 1910-1919, but has not been disturbed by logging since that time except in some small experimental watersheds (Likens 1985). The forest is uneven aged and dominated by sugar maple (*Acer saccharum* Marshall.), American beech (*Fagus grandifolia* Ehrh.) and yellow birch (*Betula alleghaniensis* Briiton.). Red spruce (*Picea rubens* Sarg.), balsam fir (*Abies balsamae* (L.) Miller.) and eastern hemlock (*Tsuga canadensis* (L.) Carriere.) are also common on ridgelines, north facing slopes and steep, rocky ravines. In addition, HBEF contains boulder fields, beaver meadows, and mountainside seep areas that contribute to the bryophyte diversity expressed in this checklist. A dirt road bisects much of HBEF providing access to experimental sites including several 0.5 ha clearings with rain gauges.

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A basalt dike in Hubbard Brook gorge supports a number of bryophytes restricted to circumneutral sites including *Preissia quadrata, Encalypta ciliata, Plagiopus oederiana, Saelania glaucescens* and *Amphidium lapponicum*. Frequently disturbed sandy sites such as moist roadside ditches and on the steep bank slides along Hubbard Brook support the infrequent species *Pohlia lescuriana* and *Pohlia bulbifera*. The constant sunny openings provided by rain gauge stations added a number of infrequent *Atrichum* species to the list. The perched wetlands along the ridgeline, which serve as bedding habitat for moose, also serve as habitat for unique mosses that grow only on animal dung, including *Splachnum ampullaceum* and *Tetraplodon angustatus*. Moose have only recently (mid 1980's) returned to the Hubbard Brook area after a 50 year absence (Wayne Martin, pers. comm.). Other infrequent species found during this survey were *Bazzania tricrenata, Lophozia capitata, Haplohymenium triste, Leskea polycarpa, Pylaisiadelphus tenuirostris* and *Rhytidiadelphus squarrosus*.

During statewide surveys for an ongoing bryophyte checklist for New Hampshire, many sites were discovered for a species of *Pohlia* which has not yet been named or described. This species seems to be restricted to New England and upstate New York. It is frequent on rather dry, but humid areas of sheltered rock ledges of all pHs throughout New Hampshire. It occurs in HBEF on the steep slopes of Hubbard Brook gorge area. Jonathan Shaw intends to name and describe the species by autumn of 1996. It is referred to in the list as *Pohlia nov. spp.* Shaw pers. comm.

The nomenclature used in this report follows Anderson, Crum & Buck (1990) for mosses except *Sphagnum* which follows Anderson (1990). The liverworts follow Schuster (1966 - 1992). All collections in this list are those of the first author and they are deposited in the Bailey Hortorium (BH), Cornell University.

**Hepaticae (36 spp.)**

**Aneuraceae**

*Riccardia latifrons* Lindb.: Cleavitt 698a

**Blasiaceae**

*Blasia pusilla* L.: Cleavitt 708

**Blepharostomaceae**

*Blepharostoma trichophyllum* (L.) Dum.: Cleavitt 571

**Calypogeiaceae**

*Calypogeia intergristipula* Steph.: Cleavitt 802
*C. muelleriana* (Schiffn.) K. Müll.: Cleavitt 1395
*C. trichomanis* (L.) Corda : Cleavitt 1388

**Cephaloziaceae**

*Cephalozia bicuspidata* (L.) Dum.: Cleavitt 710
*C. lunulifolia* (Dum.) Dum.: Cleavitt 698b
*Nowellia curvifolia* (Dicks.) Mitt.: Cleavitt 832

**Conocephalaceae**

*Conocephalum conicum* (L.) Lindb.: Cleavitt 1042

**Gymnomitriaceae**

*Marsupella emarginata* (Ehrh.) Dum.: Cleavitt 699

**Jubulaceae**

*Frullania eboracensis* Gottsche: Cleavitt 477a
*F. tamarisci* subsp. *asagrayana* (Mont.) Hatt.: Cleavitt 825
*Jubula pennsylvanica* (Steph.) Evans : Cleavitt 1392
*Lejeunea cavifolia* (Ehrh.) Lindb.: Cleavitt 1403

**Jungermanniaceae**

*Jamesoniella autumnalis* (DC.) Steph.: Cleavitt 828
*Lophozia capitata* (Hook.) Macoun.: Cleavitt 747
*L. ventricosa* (Dicks.) Dum.: Cleavitt 1381
*Solenostoma gracillimum* (Smith.) Schust.: Cleavitt 851

**Lepidoziaceae**

*Bazzania denudata* (Torrey ex Gott. et al.) Trev.: Cleavitt 1393
*B. tricrenata* (Wahl.) Trev.: Cleavitt 1041
*B. trilobata* (L.) S. Gray.: Cleavitt 819
*Lepidozia reptans* (Dum.) Dum.: Cleavitt 829

**Lophocoleaceae**

*Chiloscyphus polyanthos* (L.) Corda: Cleavitt 1396
*Lophocolea heterophylla* (Schrad.) Dum.: Cleavitt 566

**Marchantiaceae**

*Preissia quadrata* (Scop.) Nees.: Cleavitt 1116

**Pelliaceae**

*Pellia epiphylla* (L.) Corda.: Cleavitt 707
*P. neesiana* (Gott.) Limpr.: Cleavitt 1055

**Plagiochilaceae**

*Plagiochila asplenioides* subsp. *porelloides* (Torr. ex Nees.) Schust.: Cleavitt 833

**Porellaceae**

*Porella platyphylloidea* (Schwein.) Lindb.: Cleavitt 836

**Ptilidiaceae**

*Ptilidium pulcherrimum* (L.) Hampe.: Cleavitt 840

**Radulaceae**

*Radula complanata* (L.) Dum.: Cleavitt 843

**Scapaniaceae**

*Diplophyllum apiculatum* (Evans) Steph.: Cleavitt 821
*Scapania mucronata* Buch.: Cleavitt 1402
*S. nemorea* (L.) Grolle.: Cleavitt 849
*S. undulata* (L.) Dum.: Cleavitt 846

**MOSSES (140 spp.)**

**Amblystegiaceae**

*Amblystegium serpens* (Hedw.) B.S.G.: Cleavitt 383
*A. varium* (Hedw.) Lindb.: Cleavitt 701
*Campylium chrysophyllum* (Brid.) J Lange: Cleavitt 1047
*C. hispidulum* (Brid.) Mitt.: Cleavitt 576
*Hygrohypnum eugyrium* (B.S.G.) Loeske.: Cleavitt 440
*H. luridum* (Hedw.) Jenn.: Cleavitt 1394
*H. montanum* (Lindb.) Broth.: Cleavitt 442
*H. ochraceum* (Turn. ex Wils.)Loeske.: Cleavitt 444
*Leptodictyum riparium* (Hedw.) Warnst.: Cleavitt 1058
*Sanionia uncinata* (Hedw.) Loeske.: Cleavitt 434
*Warnstorfia exannulata* (Schimp. in B.S.G.) Loeske.: Cleavitt 433

**Andreaeaceae**

*Andreaea rothii* Web. & Mohr.: Cleavitt 384
*A. rupestris* Hedw.: Cleavitt 385

**Anomodontaceae**

*Anomodon attenuatus* (Hedw.) Hüb.: Cleavitt 387
*A. rugellii* (C. Müll.) Keissl.: Cleavitt 388
*Haplohymenium triste* (Ces. ex DeNot) Kindb.: Cleavitt 718

**Aulocomniaceae**

*Aulocomnium palustre* (Hedw.) Schwaegr.: Cleavitt 394

**Bartramiaceae**

*Bartramia pomiformis* Hedw. : Cleavitt 396
*Philonotis fontana* (Hedw.) Brid. : Cleavitt 720
*Plagiopus oederiana* (Sw.) Crum & Anderson: Cleavitt 1115

**Brachytheciaceae**

*Brachythecium plumosum* (Hedw.) B.S.G.: Cleavitt 397
*B. salebrosum* (Web. & Mohr.) B.S.G.: Cleavitt 721
*B. velutinum* (Hedw.) Schimp.: Cleavitt 704
*Bryhnia novae-angliae* (Sull. & Lesq. ex Sull.) Grout.: Cleavitt 407

**Bryaceae**

*Bryum lisae* De Not.
*B. lisae* var. *cuspidatum* (Bruch. & Schimp) Marg.: Cleavitt 1371
*B. pseudotriquetrum* (Hedw.) Gaertn. et. al.: Cleavitt 1113
*Pohlia annotina* (Hedw.) Lindb.: Cleavitt 989
*P. bulbifera* (Warnst.) Warnst.: Cleavitt 486
*P. lescuriana* (Sull.) Grout.: Cleavitt 990
*P. nov. sp.* Shaw pers. comm.: Cleavitt 1053
*P. nutans* (Hedw.) Lindb.: Cleavitt 488

**Buxbaumiaceae**

*Diphyscium foliosum* (Hedw.) Mohr.: Cleavitt 430

**Climaciaceae**

*Climacium americanum* Brid.: Cleavitt 724

**Dicranaceae**

*Dicranella heteromalla* (Hedw.) Schimp.: Cleavitt 417
*D. rufescens* (With.) Schimp.: Cleavitt 703
*Dicranum flagellare* Hedw.: Cleavitt 420
*D. fulvum* Hook.: Cleavitt 750
*D. montanum* Hedw.: Cleavitt 422
*D. polysetum* Sw.: Cleavitt 423
*D. scoparium* Hedw.: Cleavitt 424
*D. viride* (Sull. & Lesq. ex Sull.)Lindb.: Cleavitt 426
*Oncophorus wahlenbergii* Brid.: Cleavitt 469
*Paraleucobryum longifolium* (Hedw.) Loeske.: Cleavitt 470
*Rhabdoweissia crispata* (With.) Lindb.: Cleavitt 722

**Ditrichaceae**

*Ditrichum ambiguum* Best.: Cleavitt 1390
*D. lineare* (Sw.) Lindb.: Cleavitt 573
*D. pusillum* (Hedw.) Hampe.: Cleavitt 572
*Saelania glaucescens* (Hedw.) Broth.: Cleavitt 1043

**Encalyptaceae**

*Encalypta ciliata* Hedw.: Cleavitt 1046

**Fissidentaceae**

*Fissidens dubius* P-Beauv.: Cleavitt 437
*F. osmundioides* Hedw.: Cleavitt 1037

**Fontinalaceae**

*Fontinalis dalecarlica* Schimp. ex B.S.G.: Cleavitt 1386

**Grimmiaceae**

*Racomitrium aciculare* (Hedw.) Brid.: Cleavitt 506
*R. heterostichum* (Hedw.) Brid.: Cleavitt 507
*R. sudeticum* (Funck.) Bruch. & Schimp. in B.S.G.: Cleavitt 510
*Schistidium apocarpum* (Hedw.) Bruch. & Schimp.: Cleavitt 1382

**Hedwigiaceae**

*Hedwigia ciliata* (Hedw.) P-Beauv.: Cleavitt 719

**Hylocomiaceae**

*Hylocomiastrum umbratum* (Hedw.) Broth.: Cleavitt 445
*Hylocomium splendens* (Hedw.) B.S.G.: Cleavitt 447
*Pleurozium schreberi* (Brid.) Mitt.: Cleavitt 483
*Rhytidiadelphus squarrosus* (Hedw.) Warnst.: Cleavitt 723

**Hypnaceae**

*Callicladium haldanianum* (Grev.) Crum.: Cleavitt 408
*Herzogiella striatella* (Brid.) Iwats.: Cleavitt 438
*Hypnum fertile* Sendtn.: Cleavitt 449

*H. imponens* Hedw.: Cleavitt 725
*H. pallescens* (Hedw.) P-Beauv.: Cleavitt 451
*Isoptergiopsis muelleriana* (Schimp) Iwats.: Cleavitt 455
*I. pulchella* (Hedw.) Iwats.: Cleavitt 1373
*Pseudotaxiphyllum distichaceum* (Mitt.) Iwats.: Cleavitt 458
*P. elegans* (Brid.) Iwats.: Cleavitt 459
*Platydictya subtilis* (Brid.) Crum.: Cleavitt 580
*Platygyrium repens* (Brid.) B.S.G.: Cleavitt 479
*Ptilium crista-castrensis* (Hedw.) DeNot.: Cleavitt 497
*Pylaisiadelpha tenuirostris* (Bruch. & Schimp.) Buck.: Cleavitt 705
*Pylaisiella intricata* (Hedw.) Grout.: Cleavitt 501
*P. polyantha* (Hedw.) Grout.: Cleavitt 569
*P. selwynii* (Kindb. ) Crum et al.: Cleavitt 477a

**Leskeaceae**
*Leskea polycarpa* Hedw.: Cleavitt 462
*Leskeella nervosa* (Brid.) Loeske.: Cleavitt 463

**Leucobryaceae**
*Leucobryum glaucum* (Hedw.) Angstr. ex Fr.: Cleavitt 726

**Leucodontaceae**
*Leucodon brachypus* Brid.
*L. brachypus* var. *andrewsianus* Crum & Anderson: Cleavitt 727

**Mniaceae**
*Mnium hornum* Hedw.: Cleavitt 465
*M. thomsonii* Schimp.: Cleavitt 1380
*Plagiomnium ciliare* (C. Müll.) T Kop.: Cleavitt 1056
*P. cuspidatum* (Hedw.) T Kop.: Cleavitt 472
*Rhizomnium magnifolium* (Horik.) T Kop.: Cleavitt 513
*R. punctatum* (Hedw.) T Kop.: Cleavitt 514

**Neckeraceae**
*Homalia trichomanoides* (Hedw.) B.S.G.: Cleavitt 1038
*Neckera pennata* Hedw.: Cleavitt 468
*Thamnobryum alleghaniense* (C. Müll.) Nieuwl.: Cleavitt 1045

**Orthotrichaceae**
*Amphidium lapponicum* (Hedw.) Schimp.: Cleavitt 1112
*A. mougeotii* (B.S.G.) Schimp.: Cleavitt 1036
*Orthotrichum sordidum* Sull. & Lesq. ex Aust.: Cleavitt 564
*Ulota coarctata* (P-Beauv.) Hamm.: Cleavitt 555
*U. crispa* (Hedw.) Brid.: Cleavitt 559
*U. hutchinsiae* (Sm.) Hammar.: Cleavitt 1044

**Plagiotheciaceae**
*Plagiothecium cavifolium* (Brid.) Iwats.: Cleavitt 1054
*P. denticulatum* (Hedw.) B.S.G.: Cleavitt 474

*P. laetum* Schimp. in B.S.G.: Cleavitt 476

**Polytrichaceae**

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*A. crispum* (James) Sull.: Cleavitt 390
*A. oersteadianum* (C. Müll.) Mitt.: Cleavitt 392
*A. tenellum* (Rohl.) B.S.G.: Cleavitt 393
*A. undulatum* (Hedw.) P-Beauv.: Cleavitt 389
*Pogonatum pensilvanicum* (Hedw.) P-Beauv.: Cleavitt 485
*Polyctrihastrum alpinum* (Hedw.) G L Sm.: Cleavitt 484
*Polytrichum commune* Hedw.: Cleavitt 492
*P. formosum* Hedw.: Cleavitt 493
*P. juniperinum* Hedw.: Cleavitt 494
*P. pallidisetum* Funck.: Cleavitt 495
*P. piliferum* Hedw.: Cleavitt 567
*P. strictum* Brid.: Cleavitt 729

**Pottiaceae**

*Bryoerythrophyllum recurvirostre* (Hedw.) Chen.: Cleavitt 1385
*Tortella tortuosa* (Hedw.) Limpr.: Cleavitt 1378

**Pterigynandraceae**

*Heterocladium dimorphum* (Brid.) B.S.G.: Cleavitt 731

**Seligeriaceae**

*Blindia acuta* (Hedw.) Bruch. & Schimp. in B.S.G.: Cleavitt 1057

**Sematophyllaceae**

*Brotherella recurvans* (Michx.) Fleisch.: Cleavitt 404
*Sematophyllum marylandicum* (C. Müll.) Britt.: Cleavitt 518

**Sphagnaceae**

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*S. angustifolium* C. Jens.: Cleavitt 735
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*S. centrale* C. Jens.: Cleavitt 542
*S. cuspidatum* Ehrh.: Cleavitt 529
*S. fallax* (Klingrr.) Klingrr.: Cleavitt 530
*S. fimbriatum* Wils.: Cleavitt 531
*S. fuscum* (Schimp.) Klingrr.: Cleavitt 732
*S. girgensohnii* Russow.: Cleavitt 532
*S. magellanicum* Brid.: Cleavitt 733
*S. papillosum* Lindb.: Cleavitt 734
*S. quinquefarium* (Lindb. ex Braithw.) Warnst.: Cleavitt 652
*S. rubellum* Wils.: Cleavitt 586
*S. russowii* Warnst.: Cleavitt 536
*S. squarrosum* Crome.: Cleavitt 539

*S. teres* (Schimp.) Angstr.: Cleavitt 737

**Splachnaceae**

*Splachnum ampullaceum* Hedw.: Cleavitt 738

*Tetraplodon angustatus* (Hedw.) Bruch. & Schimp.: Cleavitt 739

**Tetraphidaceae**

*Tetraphis pellucida* Hedw.: Cleavitt 544

**Theliaceae**

*Myurella sibirica* (C. Müll.) Reim.: Cleavitt 1384

**Thuidiaceae**

*Rauiella scita* (P-Beauv.) Reim.: Cleavitt 552

*Thuidium delicatulum* (Hedw.) Schimp. in B.S.G.: Cleavitt 551

**Acknowledgements:** This research was supported, in part, by the National Science Foundation through the project Longterm Ecological Research at the Hubbard Brook Experimental Forest. Dick Andrus, Norton Miller, Cyrus McQueen and Jonathan Shaw all helped with determinations for this list and we are very grateful to them. Chris Williams and Anna Stalter each spent a day in the field with Cleavitt and their enthusiasm and company were an encouragement. The people at Pleasant View Farm must also be thanked for putting up with the mess entailed in bryological collections.

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# *Leucodon brachypus* var. *andrewsianus* In Arizona

William D. Reese[1]

*Leucodon brachypus* S. E. Bridel var. *andrewsianus* H. A. Crum & L. E. Anderson is reported new to Arizona on two collections from Coconino County discovered during review of herbarium specimens of mosses for the Flora of North America project. The Arizona populations of this moss are relictual and greatly disjunct from the main range of the taxon, in eastern North America.

Arizona. Coconino Co.: Macks Crossing, on high rock cliff in canyon, 7,000 ft., *I. M. Haring & H. S. Haskell 22,762*, 19 September 1956, CANM, MO. East Clear Creek; along the bed of the stream; vertical face of rock; 6,000 feet, *Nickolas Waser 4*, 24 June 1969, MNA.

The two specimens are from the same general area in Coconino County. "Macks Crossing" is a community in the central part of Arizona, approximately 50 miles due SE of Flagstaff, at 34°37'06"N, 111°05'31"W. Both specimens had previously been determined as *L. brachypus.*

The plants of both specimens are sterile, as are all other collections of *L. brachypus* var. *andrewsianus.* The characteristic tiny caducous branchlets are lacking in the Waser specimen but present in the Haring and Haskell specimen, although scarce. In both collections the tips of the leaves end in a characteristically elongate hyaline cell, and in some leaves the leaf cells are somewhat papillose abaxially just below the leaf tip, as in *L. julaceus* (J. Hedwig) W. S. Sullivant. The stems are elongate, straight, and slender, and the leaves are closely imbricate, as is typical for most specimens of this moss. However, in occasional collections of the var. *andrewsianus* from other parts of its range the leaves are distinctly secund, as is more typical of the var. *brachypus.*

The relictual Arizona populations of *L. brachypus* var. *andrewsianus* lie far outside of the main range of the moss, in eastern North America. Other than the Arizona populations, it is known from Newfoundland through Quebec to the Thunder Bay District of Ontario, and south to Tennessee and North Carolina. It is apparently frequent in the northern part of its range, but is scarce in the southern reaches.

The genus *Leucodon* is otherwise represented in Arizona by several specimens of *L. brachypus* var. *brachypus* from Santa Cruz County, in the extreme southern part of the state, where the taxon is likewise relictual and grossly disjunct from its main range in eastern North America. The var. *brachypus* is also known in the west from another relictual population, high up in the Chisos Mountains in Big Bend National Park, Brewster County, Texas (Magill 1976).

**Acknowledgments.** I thank the curators of CANM, MNA, and MO for making specimens available.

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# *Roccella babingtonii* in Southern Texas

Cynthia M. Galloway, Corey Burke & Dianne Leubert[1]

*Roccella babingtonii* Mont. was originally reported in North America from the Pacific Coast of Baja California and coastal southern California (Hale, 1969) and enjoys a wide spread distribution in that area (Wiggins, 1980). Species of *Roccella* generally grow in a Mediterranean climate, usually near the ocean (Hale, 1988) but, a collection of this species was made by Dr. Robert S. Egan in the east-central Texas county of Milam (Egan, 1977). This first collection from Texas was from sandstone rocks. Recently a second site in Texas, for this species, has been found in southern Texas.

Five colonies of *Roccella babingtonii* were found on the north facing outer wall of the Health and Recreation Building (gymnasium) on the campus of Texas A&M University, Kingsville. The substrate composition is textured brick. Other buildings on campus of the same era (1930-40) and brick composition were examined for additional colonies but, no other colonies were found. The colonies range in size from approximately 5 cm to 20 cm in diameter. One of the colonies is located 65 cm above ground level while two others are located 4.7 and 5.0 m above ground level. The other two colonies are intermediate between these two extremes.

Both cortex and soridia were C+ and no apothecia were found.

Collections from this site are as follows:

Texas: Kleberg County, Kingsville. Texas A&M University- Kingsville Campus, North wall of brick bldg - old gym. *Burke 3; Leubert 3* (TAIC).

The colonies are currently in jeopardy due to the practice of steam cleaning the outside of campus buildings to remove mildew.

**Acknowledgments**. The authors thank Dr. Robert S. Egan for identifying the specimens reported here and for helpful suggestions and supplies for starting a lichen herbarium at Texas A&M University, Kingsville.

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# *Barbula indica* and *Fissidens crumii* new to Hawaiian Island of Maui and the status of *Barbula unguiculata* in Hawaii

Carl Darigo[1]

During a recent trip to Hawaii, the author collected *Barbula indica* (Hook.) Spreng. in Steud., (*Darigo 2448*, MO), on the island of Maui, on moist soil in a disturbed flower bed of a resort condominium. The specimen was determined by Bruce Allen and Richard Zander. Near the same location, a collection of *Fissidens crumii* Hoe, (*Darigo 2450*, MO), was made. *F. crumii*, an unusual *Fissidens* with large leaf cells and relatively short costa, was thought to be endemic to Hawaii (Pursell & Hoe 1977). However, Ron Pursell in correspondence (1996) has indicated that *F. crumii* is probably a synonym of a widespread neotropical species. The plant was abundant along a sidewalk on moist soil in a disturbed flower bed, at 20 feet elevation. The low elevation and disturbed site match previous collections from Oahu, as described by Hoe (1974). Both *Barbula indica* and *Fissidens crumii* represent new records for the Hawaiian island of Maui.

The status of *B. indica* in the state of Hawaii has been somewhat confused. Hoe (1975a) reported *Barbula unguiculata* Hedw. as new to the Hawaiian Islands, from an Oahu collection determined by Kamezo Saito. This collection, (*Hoe 3347.0*), was later distributed as No. 22 of the Hawaiica Exsiccata (Hoe 1975b). Subsequently, a collection made by Dale Vitt from the same site, and now at BUF, was determined by Richard Zander as *B. indica.* Finally, Hoe (1978) has stated agreement with Vitt and Zander that his Hawaiica Exsiccata No. 22, distributed as *Barbula unguiculata*, better fits the concept of *B. indica.*

Recently, the Hawaiica Exsiccata No. 22 specimen at MO was examined and annotated by Bruce Allen as *B. indica*, due in part to the presence of axillary gemmae. Therefore, pending an examination of the other duplicates of Hawaiica Exsiccata No. 22, *Barbula unguiculata* is provisionally excluded from the moss flora of the state of Hawaii.

**Acknowledgments**. The author wishes to thank Bill Hoe, Ron Pursell and Richard Zander for their help in this study and also Bruce Allen of the Missouri Botanical Garden for sharing his expertise.

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# Tropical Lichens in the University of Northern Iowa Herbarium

Don Flenniken[1]

During the summer of 1969, I collected lichens from Columbia, Costa Rica and Guatemala. Specimens were deposited in the herbarium of the University of Northern Iowa (UNI), located in Cedar Falls, Iowa. This collection has been unused since that time. Recent correspondence with UNI has indicated that these lichens are available for review by those interested in tropical lichens. The purpose of this note is to inform lichenologists of the existence of this material.

Over 800 packets of lichens were collected from 20 sites in Columbia. A varied range of ecological habitats included: humid, subtropical woodland (San Andres Island, Bucaramanga, Manazales, and Santa Marta); humid, tropical woodland (Turbo and Leticia); tropical, spiny montane (Cucuta); dry, tropical woodland (Bucaramanga, Cali, & Buenaventura); dry, lower-mountain woodland (Bogota); dry, subtropical woodland (Medellin & Buenaventura); very humid, subtropical, mountain woodland (Buenaventura & Manazales); humid, lower-mountain woodland (Manazales & Santa Marta); dry, high-mountain, temperate woodland (Manazales); and very humid, mountain woodland (Santa Marta).

Approximately 475 packets of lichens were collected from 5 sites in Costa Rica (San Jose, Orosi, Turrialba, Irazu Vulcano, & Alajuela) and from 8 sites in Guatemala (Lake Amatitlan, Guatemala City, San Vicente Pacaya Vulcano, Lake Atitlan, Tikal, Flores, San Francisco, & the Interamerican Institute of Agricultural Sciences Laboratory 20 km south of San Francisco).

No attempt was made, at the time of deposition into the UNI herbarium, to identify any of the specimens, nor is any attempt made here to do so. However, my personal notes made before the specimens were placed at UNI indicated that a variety of genera are represented in this collection, including, but not limited to *Cora* [*Dictyonema*]: 1 species; *Lasallia*: 1 species; *Allectoria* [*Bryoria*]: possible 4 species; *Pseudocyphellaria*: possible 5 species; *Stricta*: as many as 16 species may be represented; *Coccocarpia* [and/or *Anzia*, *Pannaria*]: 12 species may be present; *Candelaria*: differences noted may account for 6 species; *Peltigera*: notes indicate as many as 17 species may be present; *Usnea*: morphology, chemistry, and color differences are noted in 98 different "species"; *Ramalina* [with other genera possible]; may contain upward to 30 species; *Teloschistes*: possibly 4 species; *Baeomyces* [and *Dibaeis*]: possible 10 species; *Stereocaulon*: 11 different "species" noted; *Cladonia* [=*Cladina*]: possibly 5 species; *Cladonia* (clublike, with red apothecia): 6 species noted; (clublike, with brown apothecia): 8 species noted, (pointed and sterile or only pycnidia): as many as 30 species are noted, (cuplike, goblet-shaped, non-proliferating): 16 species noted, (cuplike, goblet-shaped, marginal proliferations): 12 species noted, (cuplike, goblet-shaped, proliferating from center): 7 species noted; *Collema/Leptogium*: 16 packets, unidentified; *Pseudevernia/Anaptychia* [and *Hererodermia*]: no notes available, approximately 40 packets; *Physcia* (sens. lat.), *Pyxine*, *Anaptychia* [and *Herterodermia*]: no notes, ca. 40 packets; *Parmelia* (sens. lat.): 500+ packets; Crustose forms: ca. 100 packets.

Those interested in reviewing this collection, or any parts of it, should contact **The Department of Biology, McCollum Science Hall 2438, Cedar Falls IA 50614-0421**. For additional information regarding the "species notations" contact the author at the address given.

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# Song for Dr. Cowles

Rich Hyerczyk[1]

A few years ago I purchased a book entitled "The Lichen Flora of Chicago and Vicinity" from a used book store. Written by William Wirt Calkins and published by the Chicago Academy of Sciences in April of 1896, this flora provides information on some 125 species of lichens that Calkins found in and around the Chicago area at the turn of the last century. It was quite an exciting find.

Even more exciting were two pieces of paper that I found inside the book. On them were written what appears to be a song that students of Dr. Henry Chandler Cowles (1869 - 1939) would sing on field trips in the Chicago area. Dr. Cowles, a professor at the University of Chicago, was a pioneer in the field of Plant Ecology and vegetative succession on the sand dunes of Lake Michigan, and according to the song, must have also studied lichens. From the lyrics, Cowles seemed to quite an instructor; well liked and admired by his students.

The original owner of the book was someone named Emma Park, as her name is written on the cover of the book. Ms. Park, I assume, probably studied at the University of Chicago where Dr. Cowles once taught.

I have been able to decipher the song and want to share it with readers of *EVANSIA*. In honor of Dr. Cowles, I have given it the title, "Song for Dr. Cowles".

---

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## Song for Dr. Cowles

(CHORUS):

*We're strong for Dr. Cowles.*
*C-O-W-L-E-S.*
*Of the Prof's he's the best one.*
*His trips are more fun,*
*Than anything else we know.*
*We're strong for Dr. Cowles.*
*To his class we all love to go.*
*No matter the weather,*
*We'll all stick together.*
*In L-I-C-H-E-N-S.*

*Get on your boots and follow him,*
*He's half a mile in front.*
*It's our own Dr. Cowles, himself,*
*Out on a lichen hunt.*

*It's our own Dr. Cowles you know;*
*They've lost the pattern since.*
*Of all our friends afar and near,*
*He surely is the prince.*

*No matter what he offers here,*
*No matter where he goes.*
*He's bound to find us somewhere near,*
*Our love for him's no joke.*

(CHORUS)

*Each year we hunt for courses,*
*Not that we may learned be.*
*But if you want the reason,*
*It's not the course it's he.*

## Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

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ISSN 0747-9859

*Evansia* volume 13, number 2 was mailed on 24 July 1996

# Mosses of the Ozarks National Scenic Riverways

Paul L. Redfearn, Jr.[1]

**Abstract**. *One hundred and fifty-three taxa of mosses are reported from the Ozark National Scenic Riverways in Missouri. Four additional taxa that occur within a few miles of the Riverways are also listed.*

The Ozark National Scenic Riverways encompasses the Jacks Fork and Current Rivers in Dent, Carter, Shannon and Texas Counties in south-central Missouri along the southeast edge of the Ozark Province. The topography of this region consists of relatively flat uplands and deep stream formed valleys. High, steep bluffs are common, particularly along the Jacks Fork River. Karst topography has resulted in numerous sinkholes and subterranean stream piracy is common. One of the best examples of the latter is Jam-Up Cave on the Jacks Fork River. Many large springs flow into both rivers often forming rather long spring branches. "Shut-Ins" are numerous in the Current River Valley east Eminence. These "shut-ins" are the result of exposure of hard, erosive-resistant pre-Cambrian rock through which a stream has cut a narrow gorge. Above and below the gorge, wider valleys are often found where softer sedimentary rocks provided less resistance to erosion. Rock exposures consists of calcareous rocks such a dolomite and acidic rocks such as sandstones and pre-Cambrian rocks such as felsites and granite.

The vegetation consists of hardwood, hardwood-pine forests, cedar glades and treeless glades ("barrens") on sandstone, chert or felsite. The hardwood forests are dominated by oaks, maples and hickories on the ridges and upper slopes. Sugar Maple and White Oak forests are common on upper slopes. Mixed hardwood-pine forests are restricted to ridges. In narrow ravines and draws Sugar and Red Maple, Basswood and White Ash are common. Forests of lower slopes are frequently dominated by Sugar Maple and Bitternut Hickory.

The flora of this region is historically related to the Arcto-Tertiary Geoflora and consequently have many species in common with the Southern Appalachians and Eastern Asia. During the Pleistocene the Ozarks lay just south of maximum glaciation and served as a refugium for many taxa that today are more abundant in the northern United States and Canada. This is particularly evident on north facing bluffs above the Jacks Fork near Jam-Up cave where *Rhytidium rugosum* and *Rhytidiadelphus triquetrus* are both found. Evidence of the Arcto-Tertiary relationship is demonstrated by the presence of *Homaliadelphus sharpii* in this same region.

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The list below is the result of many years of collecting by myself and others. The representative collections cited for each are deposited at the Missouri Botanical Garden (MO) and Southwest Missouri State University (SMS). Collections made by P. L. Redfearn, Jr. are cited only by number. Rarity and commonness indicates the distribution of species in expected habitats (Gleason & Cronquist 1964). Species marked with an asterisk (*) have been found in areas close to the Ozark National Scenic Riverways but not yet within the park boundaries. Synonyms of names used in earlier reports are included in brackets.

*Amblystegium serpens* (Hedw.) B.S.G. Common on moist shaded rocks, wood and soil, particularly of lowland forests. *W. B. Drew 175.*

*Amblystegium varium* (Hedw.) Lindb. Common on moist shaded soil, rocks, logs and tree bases of hardwood forests. *7763, 37260.*

*Anomodon attenuatus* (Hedw.) Hüb. Very common on shaded rocks and soil, bases and trunks of hardwoods and cedars of both upland and lowland forests. *5808, 5781, 6951, 1482, 37327.*

*Anomodon minor* (Hedw.) Fürnr. Very common, trunks, bases, stumps, logs of hardwood trees, shaded rocks and soil of both upland and lowland forests. *5911, 8123, 9531, 10179, 26723, 37252*

*Anomodon rostratus* (Hedw.) Schimp. Very common on shaded rocks, tree bases, stumps and logs of hardwood forests, ravines and bluffs. *5886, 10195, 37198, 37270.*

*A. viticulosus* (Hedw.) Hook. & Tayl. Uncommon on moist vertical limestone, bases of bluffs along streams. *37253, 37258.*

*Aphanorhegma serratum* (W. H. Hook. f. & Wils. *in* Drumm.) Sull. *in* Gray. Rare on sandy alluvial soil. *22522.*

*Atrichum angustatum* (Brid.) B.S.G. Very common on shaded soil, soil banks and mounds of hardwood forests. *5547, 5802, 7762, 37196.*

*A. undulatum* (Hedw.) P. Beauv. Uncommon on shaded soil of rock ledges and bases of bluffs of lowland forests and ravines. *5789.*

*Aulacomnium heterostichum* (Hedw.) B.S.G. Common on moist shaded soil banks & ledges of lowland & upland forests. *Allen & Redfearn 188,* (Redfearn, Allen & Magill, 1996), *5773, 5933, 37261.*

*A. palustre* (Hedw.) Schwaegr. Uncommon on moist shaded rocks & soil, open to shaded rock slopes and bluffs. *1745, 8429, 10183, 25730.*

*Barbula convoluta* Hedw. Rare on shaded to open soil. *14019.*

*B. unguiculata* Hedw. Uncommon on rocks along streams & stream, branches.

*1448, 10072.*

*Bartramia pomiformis* Hedw. Common on moist shaded soil banks and rock ledges of hardwood forests. *5898, 6941, 8427, 10204, 37223.*

*Brachythecium acuminatum* (Hedw.) Aust. [Chamberlania acuminata (Hedw.) Grout]. Common on tree bases, logs and soil around tree bases of hardwood forests.*7772, 8116, 1104, 22867.*

*B. calcareum* Kindb. Uncommon on tree bases of hardwood forests. *37210.*

*B. oxycladon* (Brid.) Jaeg. & Sauerb. Very common on open to shaded soil, tree bases of forests and open disturbed areas.*5545, 10095, 37242.*

*B. rivulare* Schimp. *in* B.S.G. Common on rocks and logs of spring branches. *Allen & Redfearn 286* (Redfearn, Allen & Magill, 1996), *5891, 8461, 10093, 37280.*

*B. salebrosum* (Web. & Mohr) B.S.G. Common on rocks and soil of hardwood forests.*5913, 5941, 37243.*

*Bryhnia graminicolor* (Brid.) Grout. Common on rocks and soil of moist hardwood forests.*5818, 8154, 10100, 17265, 36857.*

*Bryoandersonia illecebra* (Hedw.) Robins. [Cirriphyllum boscii (Schwaegr.) Grout]. Very common on open to shaded rocks, rock ledges, and soil banks of hardwood forests. *5797, 6949, 10187, 37255.*

*Bryum argenteum* Hedw. Very common on disturbed soil and stones.*10080.*

*B. capillare* Hedw. Common on moist rock ledges of upland and lowland hardwood forests. *5514, 6955, 9485, 10199.*

*B. cyclophyllum* (Schwaegr.) Bruch & Schimp. *in* B.S.G. [B. tortifolium Funck in Brid.]. Rare on rocks in spring branch of Welch Spring. *6935.*

*B. gemmiparum* De Not. Uncommon on rocks along edge of spring branches and streams.*6935, 8428.*

*B. pseudotriquetrum* (Hedw.) Gaertn. et al. Very common on moist rocks and rock ledges of bluffs and stream banks.*5887, 6917, 8426, 10197.*

*Campylium chrysophyllum* (Brid.) J. Lange. Common on open to shaded soil, rocks and tree bases in upland and lowland forests. *Allen & Redfearn 265* (Redfearn, Allen & Magill, 1996),*5790, 6939, 8513, 10213, 37373.*

*C. hispidulum* (Brid.) Mitt. Common around bases of hardwood trees, decaying wood and rocky soil and rocks of hardwood forests. *5805. 10923.*

*Ceratodon purpureus* (Hedw.) Brid. Common on various substrates of open to shaded forests and disturbed areas.*95296, 12104.*

*Clasmatodon parvulus* (Hampe) Hook. & Wils. *ex* Sull. Very common on hardwood trees along spring branches and streams. *5520, 8122, 10992, 26719, 37234.*

*Climacium americanum* Brid. Common on open to shaded soil of bluffs, wooded slopes and bottomlands, and rock ledges.*6919, 7765, 8479, 37250.*

*C. kindbergii* (Ren. & Card.) Grout. Uncommon on shaded alluvial soil along streams and creeks. *8404.*

*Conardia compacta* (C. Müll.) H. E. Robinson. [Amblystegium compactum (C. Müll.) Aust., Rhynchostegiella compacta (C. Müll.) Loeske]. Uncommon on shaded limestone and dolomites bluffs especially under overhanging ledges. *5516, 7769, 38526*

*Cratoneuron filicinum* (Hedw.) Spruce. Common on moist vertical rocks and ledges of bluffs along stream and narrow ravines. *Allen & Redfearn 269* (Redfearn, Allen & Magill, 1996),*9516, 9548.*

*Cryphaea glomerata* B.S.G. *ex* Sull. Uncommon on stems of small trees especially along trees of north-facing slopes*33270.*

*Ctenidium malacodes* Mitt. Common on shaded rocky soil of wooded steep slopes. *Allen & Redfearn 306* (Redfearn, Allen & Magill, 1996), *1533, 5826, 22888.*

*Cyrto-hypnum pygmaeum* (Schimp. *in* B.S.G.) Buck & Crum. [Thuidium pygmaeum Schimp. *in* B.S.G.]. Common on shaded rocks along creeks and ravines. *5777, 9509. 10995, 37211.*

*C. minutulum* (Hedw.) Buck & Crum [Thuidium minutulum (Hedw.) B.S.G.]. Rare. On shaded stones of wooded slopes*36868.*

*Dicranella heteromalla* (Hedw.) Schimp. Common on shaded soil and rocks of upland woods.*5804, 7757, 10189, 17264.*

**Dicranella varia* (Hedw.) Schimp. Uncommon on shaded soil along streams. *9400.*

*Dicranum condensatum* Hedw. [D. sabuletorum Ren. & Card.]. Very common on shaded rocky soil, rock ledges, and decaying wood of wooded slopes and ridges.*5778, 7744, 9528, 10139, 12103, 37246.*

*D. flagellare* Hedw. Uncommon on shaded logs*5883, 8509.*

*D. fulvum* Hook. Rare on shaded felsite, Rocky Creek Falls.*8422, 10194.*

*D. montanum* Hedw. Uncommon on shaded sandstone and felsite rocks. *9013, 33566.*

*D. scoparium* Hedw. Very common on shaded soil of ridges, wooded slopes and rock ledges and occasionally on logs and tree bases. *5825, 8120, 8398, 10138, 36874, 37204.*

*D. spurium* Hedw. Uncommon on soil of open to shaded rock ledges. especially granite dolomite and felsite*14021, 26414, 33564.*

*Didymodon revolutus* (Card.) Williams. Rare. Soil of limestone ledge. Known only from a single collection by *W. B. Drew, 67* from Alley Spring.

*Diphyscium foliosum* (Hedw.) D. Mohr. Common on shaded soil banks and mounds of upland forests, vertical rock exposures and underside of overhanging sandstone ledges*5833, 6943, 9490, 37248.*

*Ditrichum pallidum* (Hedw.) Hampe. Very common on open to shaded soil of forests and disturbed areas.*5546, 5802, 37205.*

*Drepanocladus aduncus* (Hedw.) Warnst. Uncommon on rocks along streams and stream branches. *W. B. Drew 84, 85, 9547.*

*Drummondia prorepens* (Hedw.) Britt. Common on tress of upland and lowland forests.*8419, 10136, 10936, 37206.*

*Entodon cladorrhizans* (Hedw.) C. Müll. Uncommon on shaded rocks of wooded slopes. *8507, 10207.*

*E. compressus* (Hedw.) C. Müll. [E. challengeri (Par.) Card.]. Uncommon, tree bases and logs.*13927, 22523*

*E. seductrix* (Hedw.) C. Müll. Very common on moist shaded rocks. log, and trees of forests and bluffs.*5813, 6957, 8407, 10087, 37257.*

*Ephemerum cohaerens* (Hedw.) Hampe. Uncommon on sandy soil, edge of stream. Known only from edge of Jack's Fork River in Shannon County. *7736.*

*Eucladium verticillatum* (Brid.) B.S.G. Common on vertical moist calcareous rocks of overhanging ledges.*5938, 9537, 17274, 22869, 37233.*

*Eurhynchium hians* (Hedw.) Sande Lac. [Oxyrhynchium hians (Hedw.) Jenn.]. Common on soil, rocks and logs of hardwood forests. *8504, 10994.*

*E. pulchellum* (Hedw.) Jenn. [E. pulchellum var. praecox (Hedw.) Dix.]. Common on shaded rocky soil and boulders, tree trunks, and bases of hardwood forests.*5834, 7748, 10921, 22521.*

*Fabronia ciliaris* (Brid.) Brid. Common on trunks of hardwoods and cedars, and vertical rock surfaces of upland forests. *9484, 1082.*

*Fissidens adianthoides* Hedw. Uncommon on soil and rocks along streams. *8424, 10182.*

*F. bryoides* Hedw. var. *bryoides* [F. minutulus Sull., F. viridulus (Sw.) Wahlenb.]. Common on shaded soil of hardwood forests. *10174, 37266*

*F. bryoides* var. *pusillus* (Wils.) Pursell *in* Allen [F. pusillus Wils.]. Uncommon, on calcareous wet, shaded calcareous rocks along spring branches*9505*

*F. bushii* (Card. & Thér.) Card. & Thér. Uncommon on soil and rocks along streams.*36879.*

*F. dubius* P. Beauv. [F. cristatus Hedw.]. Very common on shaded soil, rocks, tree trunks and bases, and logs of bluffs, slopes and ridges. *5830, 6930, 9512, 12105, 22872, 36955, 37291.*

*F. fontanus* (B. Pyl.) Steud. [F. debilis Schwaegr.]. Uncommon on submerged rocks and branches of small creeks and spring branches. *Allen & Redfearn* 55 (Redfearn, Allen & Magill, 1996)*5912.*

*F. grandifrons* Brid. Common on rocks especially of spring branches. *5529, 8466, 10993, 28635.*

*F. subbasilaris* Hedw. Common on shaded moist rocks. soil, decaying wood and bases and trunks of trees of lowland woods.*5917, 8126, 10091, 37227.*

*F. taxifolius* Hedw. Very common on shaded soil, rock ledges and crevices, bases of trees and decaying logs. *5534, 5942, 7750, 37202*

*Fontinalis duriaei* Schimp. Common on roots, tree bases and stone in spring branches, creeks and streams. *Allen 213* (Redfearn, Allen & Magill, 1996), *8155, 8464, 9536, 10085.*

*F. hypnoides* C. J. Hartm. Common on rocks in spring branches. *Allen, Buck & Harris 68* (Allen 1991), *36956.*

*F. missourica* Card. Common on roots and rocks in spring branches. *Allen & Johnson 22* (Allen 1986), *Allen & Magill 43* (Allen 1989), *10192.*

**F. novae-angliae* Sull. On rocks, tree limbs and roots in spring branches and small streams. *John H. Kellogg, 20 Nov. 1927.*

*Fontinalis sullivantii* Lindb. [F. filiformis Sull. & Lesq. in Sull.]. Common on rocks, tree roots and logs in spring branches. *Allen & Magill 50*, (Allen 1989), *Allen 81*, (Allen 1991), *1480. 2028, 8421, 10191.*

*Forsstroemia producta* (Hornsch.) Par. [F. ohioensis (Sull.) Lindb.]. Rare, on tree along Gladden Creek in Shannon County. *10075.*

*F. trichomitria* (Hedw.) Lindb. Common on hardwood trees and cedar of lowland and upland forests. *5916, 8153, 9520, 14022, 22868.*

*Funaria flavicans* Lindb. *in* Sull. Common on rocks along edges of creeks and on soil of open disturbed areas. *5521.*

*F. hygrometrica* Hedw. Common on soil of open disturbed areas and around ash piles. *8121, 12124.*

*Grimmia laevigata* (Brid.) Brid. Very common on rocks in open areas. *6938, 8402, 10929, 13925, 36873.*

*G. olneyi* Sull. Rare, on felsite rock, Rocky Creek Falls. *10203, 28646.*

*G. pilifera* P. Beauv. Very common on rocks in open to shaded areas. *6929, 8128, 10142, 10920, 22887, 38522b.*

*Gymnostomum aeruginosum* J. Sm. Common on vertical moist calcareous and siliceous rocks especially at bases of bluffs near streams. *9507, 28637, 37290.*

*Haplocladium virginianum* (Brid.) Broth. Very common on rocky soil, rocks, tree bases in upland hardwood forests. *5785, 8117, 10922.*

*Haplohymenium triste* (Ces.) Kindb. Very common on hardwoods and cedars and shaded vertical rock surfaces. *5939, 7752, 8423, 10084, 10133, 37228.*

*Hedwigia ciliata* (Hedw.) Ehrh. *ex* P. Beauv. Very common on rocks in open areas, especially bluffs. *5539, 8406, 10927, 10209, 37225.*

*Homaliadelphus sharpii* (Williams) A. J. Sharp. Rare, on north-facing dolomite bluffs along Jacks Fork River near Bay Creek. *26339, 26718, 26725.*

*Homalotheciella subcapillata* (Hedw.) Broth. Common on upland hardwood trees. *Allen & Redfearn 294* (Redfearn, Allen & Magill, 1996), *5535, 7767, 9535, 10175.*

*Homomallium adnatum* (Hedw.) Broth. Common on open to shaded rocks and decaying stumps and limbs of hardwood and hardwood -conifer forests. *Redfearn & Allen 308* (Redfearn, Allen & Magill, 1996), *38521*

*Hygroamblystegium fluviatile* (Hedw.) Loeske [Amblystegium fluviatile (Hedw.) Schimp. *in* B.S.G.]. Very common on moist shaded soil, rocks, decaying wood, often submerged in stream and creeks. *5918, 8472, 9521, 10096.*

*H. noterophilum* (Sull. & Lesq.) Warnst. [Amblystegium noterophilum (Sull. & Lesq. *in* Sull.) Holz.]. Uncommon on rocks in streams and spring branches. *Redfearn & Allen 274* (Redfearn, Allen & Magill, 1996), *W. B. Drew 57, 5529, 38527.*

*H. tenax* (Hedw.) Jenn. [Amblystegium irriguum (Hook. & Wils.) Schimp. in B.S.G.]. Common on rocks, decaying wood and tree bases in creeks, streams and seepage areas. *5921, 5892, 10205, 3725b.*

*H. tenax* var. *spinifolium* (Schimp.) Jenn. [Amblystegium irriguum (hook. & Wils.) Sciimp. var. spinifolium Schimp., A. tenax (Hedw.) C. Jens. var. spinifolium (Schimp.) Jenn.]. Common on rocks in swiftly flowing streams and spring branches. *28636, 32525.*

*Hymenostylium recurvirostre* (Hedw.) Dix. [Gymnostomum recurvirostre Hedw. *ex* Brid.]. Common on moist, vertical calcareous rocks of bluffs along streams. *5884, 7768, 8464, 9532, 10178, 36866, 37212.*

*Hyophila involuta* (Hook.) Jaeg. [H. tortula (Schwaegr.) Hampe]. Common on open to shaded rocks along edges creeks and streams. *8476, 9513, 10176, 22875, 37268.*

*Hypnum cupressiforme* Hedw. var. *filiforme* Brid. [H. cupressiforme var. resupinatum (Tayl. ex Spruce) Schimp.]. Rare, on vertical rocks, known only from Prairie Hollow Shut-In near the Jacks Fork River. *33365.*

*Hypnum curvifolium* Hedw. Common on shaded rocks, rocky soil, rock ledges and logs. *Allen 9801, 16208*

*Hypnum lindbergii* Mitt. Common on open to shaded rocks, soil and decaying wood along edges of creeks and streams. *27409, 36887.*

*Isopterygium tenerum* (Sw.) Mitt. [Plagiothecium micans (Sw.) Par.]. Common on decaying logs, stumps and tree bases of hardwood forests. *5579, 9494.*

*Leptodictyum humile* (P. Beauv.) Crum & Anderson. [Amblystegium kochii Schimp. in B.S.G., A. trichopodium var. kochii (Schimp. in B.S.G.) Broth.] Common on moist soil, decaying wood and rocks along streams and creeks. *11022, Steyermark 76381.*

*Leptodictyum riparium* (Hedw.) Warnst. [Amblystegium riparium (Hedw.) Schimp. in B.S.G.]. Common on moist soil, decaying wood and rocks along streams and creeks. *8124, 8468, 9525, 10073.*

*Leskea gracilescens* Hedw. Very common on trees and logs of lowland of lowland forests. *5821, 10083, 22516, 37197.*

*Leskea obscura* Hedw. Common on hardwood trunks and bases of hardwood trees and shaded rocks, especially along streams. *5814, 37263.*

*Leucobryum glaucum* (Hedw.) Ångstr. *in* Fries. Very common on shaded rocks soil, rock ledges, logs and tree bases of hardwood forests. *5885, 8410, 10935, 37320.*

*Leucodon julaceus* (Hedw.) Sull. [Leucodontella julacea (Hedw.) Nog.]. Common on shaded to open rocks, trees, stumps and logs of hardwood and hardwood coniferous forest. *5838, 8473, 10932, 37240.*

**Lindbergia brachyptera* (Mitt.) Kindb. Common on tree trunk of hardwoods and cedars. *9408.*

*Mnium marginatum* (With.) Brid. *ex* P. Beauv. Common on moist shaded rocks, especially in crevices and undersides of overhanging ledges, occasionally on bases of hardwood trees and soil. *8475, 9508, 12118.*

*M. thomsonii* Schimp. [M. orthorrhynchum Brid.]. Uncommon on moist shaded calcareous and siliceous rocks. *8471.*

*Myurella sibirica* (C. Müll.) Reim. [M. careyana Sull. in Sull. & Lesq.]. Rare in crevices of calcareous rocks along creeks and streams. *8470, 12122, 26722, 29102.*

*Orthotrichum ohioense* Sull. & Lesq. *ex* Aust. Common on trees of upland and lowland forests. *5791, 8149, 8511.*

*O. pumilum* Sw. Common on trees of upland and hardwood forests. *B. F. Bush (221 of Cardot).*

*O. pusillum* Mitt. Uncommon on hardwood trees. *5819, 8150, 8414, 9524.*

*O. stellatum* Brid. Uncommon on hardwood trees. *8149*

*O. strangulatum* P. Beauv. Common on open to shaded calcareous to siliceous rocks especially of bluffs. *5792, 6944, 9529, 22876.*

*Philonotis fontana* (Hedw.) Brid. Common on moist rocks and bluffs. *8412, 10182.*

*P. marchica* (Hedw.) Brid. Common on moist rocks and soil along stream banks and gullies. *B. F. Bush (208 of Cardot).*

*Physcomitrium pyriforme* (Hedw.) Hampe. Common on disturbed soil of fields, along paths and roads. *5820, 10076.*

*Plagiomnium ciliare* (C. Müll.) T. Kop. [Mnium affine Bland. ex Funck]. Very common on shaded soil and rocks of hardwood forests. *5283, 5786, 9506, 37224.*

*P. cuspidatum* (Hedw.) T. Kop. [Mnium cuspidatum Hedw.]. Very common on soil and rocks of forests, bluffs and banks of streams and creeks *8114*

*Platydictya confervoides* (Brid.) Crum. Common on open to shaded calcareous rocks. *10104, 22873, 37281.*

*P. subtilis* (Hedw.) Crum. Uncommon on logs and tree trunks and bases of hardwood forests. *5524, 12125, 37247.*

*Platygyrium repens* (Brid.) Bruch & Schimp. *in* B.S.G. Very common on tree trunks, stumps and logs of upland and lowland forests. *10937, 26724, 37199.*

*Platyhypnidium riparioides* (Hedw.) Dix. [Rhynchostegium riparioides (Hedw.) Jenn.]. Common on rocks in streams and spring branches. *Redfearn 296* (Redfearn, Allen & Magill, 1996)*,5935, 8489, 10996, 37189.*

**Pleurochaete squarrosa* (Brid.) Lindb. Common on open to shaded soil of cedar glades. *10128.*

*Pleurozium schreberi* (Brid.) Mitt. Uncommon on rocks shaded soil of upland forests, especially north-facing along Jacks Fork. *Allen & Redfearn 328* (Redfearn, Allen & Magill, 1996), *6838, 32531.*

*Pogonatum brachyphyllum* (Michx.) P. Beauv. Uncommon on shaded soil banks along ditches, trails and roads.*9489.*

*P. pensilvanicum* (Hedw.) P. Beauv. Uncommon on shaded soil along road cuts and ditches.*7751.*

*Pohlia nutans* (Hedw.) Lindb. Very common on open to shaded rocky soil, rock ledges, crevices and tree bases of upland forests. *5540, 6936, 8417, 10919.*

*P. wahlenbergii* (Web. & Mohr.) Andrews. Common on wet rocks and soil along edges of creeks and streams. *8127, 8480, 22511.*

*Polytrichum commune* Hedw. Common on open to shaded soil around trees, on rocks ledges and on soil pockets of felsite and granite boulders. *B. F. Bush (290 of Cardot).*

*P. juniperinum* Hedw. Very common on rocks soil of upland forests and on thin soil over flat exposures of sandstone, granite and felsite. *1533, 5827, 8401, 8505.*

*P. ohioense* Ren. & Card. Very common on open to shaded soil, rocks ledges particularly of upland forests.*5837, 8510, 10134, 37221.*

*Pseudotaxiphyllum elegans* (Brid.) Iwats. [Isopterygium elegans (Brid.) Lindb.]. uncommon on soil particularly in crevices and under overhanging ledges. *8418, 27408.*

*Ptychomitrium incurvum* (Schwaegr.) Sull. Common on open to shade rocks. *1391, 6945, 8152, 38520.*

*Pylaisiella selwynii* (Kindb) Crum, Steere & Anderson. Very common on decaying logs, stumps and tree trunks particularly of upland forests. *8502, 37192, 37282.*

*Rhodobryum roseum* (Hedw.) Limpr. Common on open to shaded soil of rock ledges of slopes and bluffs. *5533, 8129, 17270, 19534.*

*Rhytidiadelphus triquetrus* (Hedw.) Warnst. Uncommon on rocky soil of north facing bluffs and open hardwood-pine forest of the upper Jacks Fork. *Allen & Redfearn 329* (Redfearn, Allen & Magill, 1996), *11216, 17275, 26413, 26727.*

*Rhytidium rugosum* (Hedw.) Kindb. Rare on rocky soil of north facing bluffs and open hardwood-pine forest of the upper Jacks Fork. *6984, 26730a.*

*Schistidium apocarpum* (Hedw.) Bruch & Schimp. *in* B.S.G. [Grimmia apocarpum Hedw.]. Common on dry, exposed rocks. *5909, 10081, 37272.*

*S. rivulare* (Brid.) Podp. [S. agassizii Sull. & Lesq. in Sull.]. Common on moist rocks along edges of creeks and streams. *37216.*

*Schwetschkeopsis fabronia* (Schwaegr.) Broth. [S. denticulata (Sull.) Broth.]. Uncommon on smooth-barked trees and shaded moist rocks. *1716, 22525.*

*Sematophyllum adnatum* E. G. Britton. Uncommon on shaded logs & tree bases of hardwood forests. *13932.*

*S. demissum* (Wils.) Mitt. [S. carolinianum (C. Müll.) Britt.]. Uncommon on shaded logs and tree bases, sandstone and felsite rocks. *8506, 13929, 37229.*

*Steerecleus serrulatus* (Hedw.) Robins. [Brachythecium serrulatum (Hedw.) Robins., Rhynchostegium serrulatum (Hedw.) Jaeg.]. Very common on open to shaded rocks and soil of hardwood and pine-hardwood forests. *7746, 9527, 10186, 22524.*

*Syntrichia pagorum* (Milde) Amann. [Tortula pagorum (Milde) De Not.]. Common on trunks of hardwoods and cedars of upland forests and cedar glades. *10939*

*Taxiphyllum deplanatum* (Bruch & Schimp) *ex* Sull.) Fleisch. [Plagiothecium deplanatum (Bruch & Schimp. ex Sull.) Spruce]. Common on shaded calcareous soil and rocks of wooded slopes and bluffs. *5934, 6934, 9449, 37249.*

*T. taxirameum* (Mitt.) Fleisch. [Plagiothecium geophilum (Aust.) Grout]. Common on shaded calcareous rocks and soil and occasionally on tree bases and logs along stream banks and moist bluffs. *5816, 8119, 9511, 10137.*

*Thelia asprella* Sull. Very common on bark of hardwoods, logs, rocks and soil of dry open upland woods *5538, 36872, 37194.*

*T. lescurii* Sull. *in* Sull. & Lesq. Uncommon on dry soil of upland hardwood forests, cedar glades and rocky barrens. *10135.*

*T. hirtella* Sull. Common around bases of hardwoods and cedars of upland forests and cedar glades. *Allen & Redfearn 257* (Redfearn, Allen & Magill, 1996), *7754, 8158, 10201.*

*Thuidium delicatulum* (Hedw.) B.S.S. Common on moist, shaded soil, humus and rock ledges of forests. *5782, 8416, 10190.*

*T. recognitum* (Hedw.) Lindb. Very common on dry, open rocks, calcareous soil of upland forests. *Redfearn 243* (Allen, Redfearn, & Magill, 1996), *5543, 5783, 37220.*

*Timmia megapolitana* Hedw. Uncommon on moist calcareous soil along streams, gullies and ledges.*17272.*

*Tortella humilis* (Hedw.) Jenn. Common on shaded rocky soil and tree bases of hardwood and hardwood-coniferous forests and cedar glades. *10924, 37269.*

*Tortula obtusifolia* (Schwaegr.) Math. [*Desmatodon obtusifolius* (Schwaegr.) Schimp.]. Uncommon on sandstone, edge of creek, Jam-Up Cave. *27419*

*Trichostomum tenuirostre* (Hook. & Tayl.) Lindb. Rare on shaded vertical calcareous bluffs along streams. *27400.*

*Weissia controversa* Hedw. Very common on open to shaded soil of woodlands and disturbed areas. *5835, 9530, 10215, 37222.*

*Weissia jamaicensis* (Mitt.) Grout. [Trichostomum jamaicensis(Mitt.) Jaeg.]. Uncommon on calcareous and siliceous rocks along streams and creeks. *8490.*

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# The Lichen Exchange

sponsored by the American Bryological and Lichenological Society

Thomas H. Nash III, Director

**Purpose:** To foster knowledge in lichen identification, the American Bryological and Lichenological Society has supported an exchange program for many years. Anyone interested in lichens is welcome to participate (societal membership is not required, although it is certainly encouraged.)

**Location:** the exchange was recently switched to Arizona State University under the direction of Dr. Thomas H. Nash III. All correspondence should be directed to his attention at "Dept. of Botany, Arizona State Univ., Box 871601, Tempe, AZ 85287-1601, USA"

**Frequency:** In general exchanges are planned twice a year. Distributions are anticipated in November and May of each year. Lists of available specimens will be made available approximately 1 October and 1 April each year. People wishing to participate in the exchange should thus communicate with the director in September and March of each year. A list of specimens (and their number) should be provided as well as the exchange material itself. Material received after the October 1 or April 1 deadlines will be held until the next exchange time.

**Procedures:** Individuals submitting material for exchange are requested to include a variety of species and not to overly emphasize common ones. Each species should ideally include 10-15 duplicates, although smaller and larger sets of duplicates will also be accepted. Each person submitting exchange will be given an exchange credit of one specimen for each packet submitted, but limited to no more than 15 credits for any given collection number (*e.g.* a set of 20 duplicates would only receive 15 credits). From the list of available specimens will then be provided each participant to use in requesting exchange to be received against her/his credit account. In the case of more requests for a collection than specimens available, then it will be the prerogative of the director to develop a system for selecting who receives the specimens. One specimen of each collection submitted will be retained by Arizona State University in its lichen herbarium as consideration for coordination the service.

**The specimens:** All specimens should be fully identified (partially identified or unidentified material will be returned to the sender). It is recommended that each specimen's packet be ca 4" X 6" (*e.g.* 10 X 15 cm) and that the specimen be large enough to fill most of the packet. Labels should be on 100% rag paper and should **not** be glued to the packets (because styles of herbarium packets vary widely). It is recommended that labels include information on location (major and local political units), longitude and latitude, substrate, habitat, collector and her/his collection number, date of collection and determinater (see Hale's *How to Know the Lichens* for an example). Large specimens may require pressing to prevent fragmentation and rock and bark fragments should be mounted on a card.

# Mosses from the State of Missouri *Micromitrium megalosporum* and *Bryum pallescens* New to the State and Other New County Records

Carl Darigo[1]

This paper reports ***Micromitrium megalosporum*** Aust. and ***Bryum pallescens*** Schleich. ex Schwaegr. new to the state of Missouri, plus 152 other new moss county records from eastern and western Missouri (Fig. 1).

The Missouri river cuts, in a more or less east-west direction, through the state of Missouri. To the north of the river is found the Glaciated Prairie, an area that occupies roughly the northern one-third of the state. To the south of the Missouri river lies the northern edge of the Interior Highlands of North America. The northernmost section of the Interior Highlands consists of the Salem Plateau and the most common habitat in this region is oak-hickory forests. Within the Salem Plateau in southeastern Missouri lies the St. Francois Mountains. The Mississippi Lowlands is a region in the far southeastern "bootheel" of the state, near the Mississippi River.

The Border counties are the one to two tiers of counties north of the Missouri River, immediately adjacent to the Interior Highlands. New county records were distributed as follow:
**Glaciated Prairie** -- (40): Clark (4), Holt (1), Lewis (1), Macon (1), Monroe (1), Pike (2), Platte (1), Putnam (3), Schuyler (12), Scotland (8), Shelby (6).
**Border** -- (61): Audrain (1), Lincoln (32), Montgomery (16), St. Charles (10), Randolph (1), Warren (1).
**Salem Plateau** -- (28): Butler (5), Carter (3), Crawford (3), Franklin (1), Oregon (4), Ripley (2), St. Francois (4), St. Louis (2), Shannon (1), Washington (3).
**St. Francois Mountains** -- (14): Iron (10), Reynolds (1), Wayne (3).
**Mississippi Lowlands**-- (9): Mississippi (9).

Collections were made either during Botany Group outings of the Webster Groves Nature Study Society, or on private trips. Several previously unpublished collections by Bruce Allen, William Buck, Dolly Darigo, Greg Pedano and Paul Redfearn are included. Bruce Schuette, Park Naturalist for Cuivre River and

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Graham Cave State Parks, furnished specimens for analyses that he and Margaret Feigley (since deceased) collected during the 1980's; all Feigley collections are unnumbered.

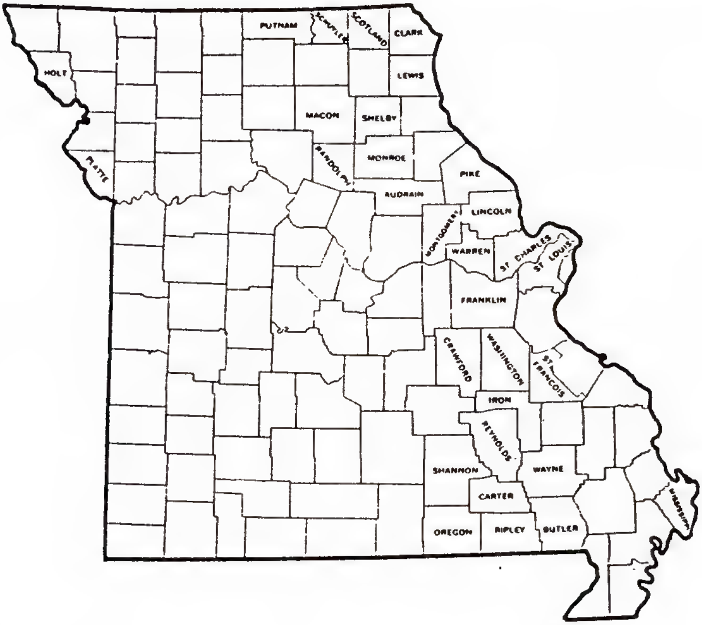

Figure 1. County map of Missouri highlighting those counties from which mosses are report.

All specimens were verified by Bruce Allen and are deposited at MO. Distribution comments were taken from Redfearn (1983) and the Rare and Endangered Species of Missouri Checklist (Anonymous, 1995).

AMBLYSTEGIACEAE

***Amblystegium serpens*** (Hedw.) Schimp. in B.S.G.- **Lincoln**: B. K. Leach Conservation Area, Darigo & Darigo 2456.

***A. varium*** (Hedw.) Lindb.-**Shelby**: near Cherry Box, Darigo & Vanderbilt 2293.

***Campylium chrysophyllum*** (Brid.) J. Lange - **Montgomery**: Graham Cave State Park, Feigley.

***C. hispidulum*** (Brid.) Mitt.- **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2261.

***Drepanocladus aduncus*** (Hedw.) Warnst. var. ***aduncus*** - **St. Francois**: St. Francois State Park, Darigo 2391. Uncommon, reported in only nine other counties; this collection represents the easternmost station in the state for this taxon.

***Hygroamblystegium noterophilum*** (Sull. & Lesq. in Sull.) Warnst.- **St. Francois**: St. Francois State Park, Darigo 2394. Uncommon.

***H. tenax*** (Hedw.) Jenn. var. ***tenax*** - **Clark**: Battle of Athens State Park, Darigo & Vanderbilt 2269. **Montgomery**: Graham Cave State Park, Feigley. **Crawford**: Reis Biological Field Station, Pedano 700.

***Leptodictyum humile*** (P. Beauv.) Ochyra - **St. Charles**: Katy Trail State Park, Darigo & Vanderbilt 2196.

***L. riparium*** (Hedw.) Warnst.- **Putnam**: Rebel's Cove Conservation Area, Darigo & Sullivan 2371. **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2334. **Lincoln**: Cuivre River State Park, Allen 4828. **St. Charles**: Dresser Island Access, Darigo & Darigo 2458. **Mississippi**: Big Oak Tree State Park, Allen 17121.

***Platylomella lescurii*** (Sull. in Gray) Andrews - **Iron**: Taum Sauk Mountain State Park, Darigo 2563. Previously reported in only three other Missouri counties and listed as Rare in Rare and Endangered Species Checklist of Missouri, Anonymus (1995).

## ANOMODONTACEAE

***Anomodon minor*** (Hedw.) Furnr.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2324. **Montgomery**: Graham Cave State Park, Feigley. **Missssissippi**: Big Oak Tree State Park, Allen 17123.

***Haplohymenium triste*** (Ces. in De Not.) Kindb.- **Montgomery**: Graham Cave State Park, Feigley.

## BARTRAMIACEAE

***Philonotis fontana*** (Hedw.) Brid. var. ***fontana*** - **Lincoln**: Cuivre River State Park, Feigley. **Montgomery**: Graham Cave State Park, Feigley. **Wayne**: Sam A. Baker State Park, Allen 17068.

## BRACHYTHECIACEAE

***Brachythecium acuminatum*** (Hedw.) Aust. var. ***acuminatum*** - **Clark**: Battle of Athens State Park, Darigo & Vanderbilt 2272. **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2264.

***B. acuminatum*** (Hedw.) Aust. var. ***cyrtophyllum*** (Kindb.) Redf. & Crum - **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2263. **Franklin**:

Meramec State Park, Darigo 2433. Common, but has been infrequently collected, being recorded in only five other Missouri counties; differs from var. ***acuminatum*** in having shorter, broader, more concave leaves, shorter and less acuminate tips, and shorter leaf cells.

***B. oxycladon*** (Brid.) Jaeg.- **Putnam**: Rebel's Cove Conservation Area, Darigo & Sullivan 2379. **Montgomery**: Graham Cave State Park, Feigley.

***B. plumosum*** (Hedw.) Schimp. in B.S.G.- **Iron**: Taum Sauk Mountain State Park, Allen 17057. Uncommon.

***B. salebrosum*** (Web. & Mohr) Schimp. in B.S.G. var. ***salebrosum*** - **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2347.

***Bryhnia graminicolor*** (Brid.) Grout - **Lincoln**: Cuivre River State Park, Schuette 2668.

***Bryoandersonia illecebra*** (Hedw.) Robins.- **Lincoln**: Cuivre River State Park, Feigley.

***Eurhynchium hians*** (Hedw.) Sande-Lac.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2328. **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2260. **Lincoln**: Cuivre River State Park, Feigley. **St. Francois**: St. Francois State Park, Darigo 2390.

***E. pulchellum*** (Hedw.) Jenn. var. ***pulchellum*** - **Lincoln**: Koenig Property near Argentville, Darigo & Vanderbilt 2481.

BRYACEAE

***Bryum argentum*** Hedw.- **Pike**: County Rd 902, Darigo & Darigo 2479. **St. Charles**: A. A. Busch Conservation Area Darigo & Darigo 2459.

***B. caespiticium*** Hedw.- **Iron**: Taum Sauk Mountain State Park, Allen 17045. Uncommon, first report in St. Francois Mountains.

***B. dichotomum*** Hedw.- **Lincoln**: Cuivre River State Park, Darigo & Darigo 2501. **St. Charles**: A. A. Busch Conservation Area, Darigo & Darigo 2461. **Crawford**: Meramec State Park, Darigo 2493. **Iron**: Elephant Rocks State Park, Darigo 2549. Uncommon, not previously reported in Border counties or St. Francois Mountains.

***B. lisae*** De Not. var. ***cuspidatum*** (Bruch & Schimp. in B.S.G.) Marg.- **St. Charles**: Hwy 79 near Cuivre River, Darigo & Darigo 2415. **Washington**: Washington State Park, Darigo 2510.

***B. miniatum*** Lesq.- **Iron**: Taum Sauk Mountain State Park, Allen 17046. Previously reported only once in Missouri and listed as Endangered in Missouri.

***B. pallescens*** Schleich. ex Schwaegr.- **Washington**: Washington State Park, Darigo 2509. Collected (sterile specimen) on partially shaded rocky soil near a trail at 710 feet elevation, in an upland oak-hickory forest; T39N, R3E, section 22, SW ¼. This is a cosmopolitan species of world-wide distribution. It occurs throughout the USA except for the south central and southeastern sections of the country. The closest station to Missouri of this species is in Ohio.

***B. pseudotriquetrum*** (Hedw.) Gaertn. et al.- **St. Charles**: Hwy 79 near Cuivre River, Darigo & Darigo 2416. **Wayne**: Sam A. Baker State Park, Allen 17066.

***Pohlia annotina*** (Hedw.) Lindb.- **Montgomery**: Graham Cave State Park, Feigley. Rare, reported from only two other Missouri counties; this collection is the farthest north and east location for this species in the state.

***P. wahlenbergii*** (Web. & Mohr) Andrews - **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2342.

BUXBAUMIACEAE

***Diphyscium foliosum*** (Hedw.) Mohr - **Lincoln**: near Cuivre River State Park, Feigley. This collection was originally determined as ***Barbula convoluta*** Hedw.

CLIMACIACEAE

***Climacium americanum*** Brid.- **Mississippi**: Big Oak Tree State Park, Allen 17124.

DICRANACEAE

***Dicranum condensatum*** Hedw.- **Lincoln**: Cuivre River State Park, Schuette 2646.

DITRICHACEAE

***Ceratodon purpureus*** (Hedw.) Brid.-**Lincoln**: Cuivre River State Park, Feigley.

***Ditrichum pallidum*** (Hedw.) Hampe - **Iron**: Taum Sauk Mountain State Park, Darigo 2554.

ENTODONTACEAE

***Entodon seductrix*** (Hedw.) C. Mull.- **Clark**: Battle of Athens State Park, Darigo & Vanderbilt 2277. **Lewis**: Wakonda State Park, Darigo & Vanderbilt 2283. **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2320. **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2259. **Montgomery**: near Mineola, Redfearn & Key 27769. **Mississippi**: Big Oak Tree State Park, Allen 17128.

***E. cladorrhizans*** (Hedw.) C. Mull.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2337.

EPHEMERACEAE

***Micromitrium megalosporum*** Aust.- **Reynolds**: Johnson's Shut-Ins State Park, Buck 24203. Collected on a rhyolitic and granitic talus slope at 815 to 975 feet elevation, near the East Fork of Black River opposite the Shut-Ins, in a hardwood-juniper forest; 37° 32' N, 90° 50' W. This collection was determined by Virginia Bryan. According to Virginia Bryan (pers. comm. 1996), current USA distribution of ***M. megalosporum*** is Michigan, Maine, Connecticut, Massachusetts, Pennsylvania, Maryland, North Carolina, Florida, Georgia, Mississippi and Louisiana. The Missouri finding is approximately 250 miles north of its closest previous station in northwest Mississippi.

FABRONIACEAE

***Clasmatodon parvulus*** (Hampe) Hook. & Wils. ex Sull. in Gray - **Lincoln**: Koenig Property near Argentville, Darigo & Vanderbilt 2482.

***Fabronia ciliaris*** (Brid.) Brid. var. ***ciliaris*** - **Carter**: Ozark National Scenic Riverways, Hwy Z, Darigo 2172.

FISSIDENTACEAE

***Fissidens adianthoides*** Hedw.- **Shannon**: The Nature Conservancy, Shut-In Mountain fen, Darigo 2174. Uncommon, reported in only four other Missouri counties.

***F. bushii*** (Card. & Ther.) Card. & Ther.- **Ripley**: Cupola Gum Pond Natural Area, Allen 17083. **Iron**: Taum Sauk Mountain State Park, Allen 17050. Uncommon, first report in St. Francois Mountains.

***F. fontanus*** (B. Pyl.) Steud.- **Lincoln**: Cuivre River State Park, Allen 4810. **Butler**: Allred Lake Natural Area, Allen 17113.

***F. grandifrons*** Brid.- **Oregon**: Greer Springs, Redfearn 6008. Uncommon.

***F. osmundioides*** Hedw.- **Lincoln**: Cuivre River State Park, Feigley. Uncommon.

***F. taxifolius*** Hedw.- **Lincoln**: Cuivre River State Park, Darigo & Darigo 2426. **Crawford**: Meramec State Park, D. Darigo 6.

FONTINALACEAE

***Dichelyma capillaceum*** (With.) Myr.- **Butler**: Allred Lake Natural Area, Allen 17116. Known in Missouri from only two other counties and listed as Endangered in Missouri.

***Fontinalis sullivantii*** Lindb.- **Ripley**: Mark Twain National Forest, Cupola Gum Pond Natural Area, Allen 17076. Known in Missouri from only three other counties and listed as Endangered in Missouri.

## FUNARIACEAE

***Funaria hygrometrica*** Hedw.- **Pike**: County Rd 902, Darigo & Darigo 2480. **Iron**: Taum Sauk Mountain State Park, Darigo 2555.

***F. flavicans*** Michx.- **Oregon**: Turner Spring Recreation Area, Allen 17094.

***Physcomitrium pyriforme*** (Hedw.) Hampe - **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2253a. **Wayne**: Sam A. Baker State Park, Allen 17064.

## HYLOCOMIACEAE

***Rhytidiadelphus triquetrus*** (Hedw.) Warnst.- **Lincoln**: Cuivre River State Park, Allen 4826. Previously reported in only five other Missouri counties and listed as Rare in Missouri. .

## HYPNACEAE

***Homomallium adnatum*** (Hedw.) Broth.- **Lincoln**: Cuivre River State Park, Schuette 2659.

***Hypnum lindbergii*** Mitt.- **Shelby**: Oxbow Nature Trail near Bethel, Darigo & Vanderbilt 2307. **Washington**: Washington State Park, Darigo 2107.

***Platydictya confervoides*** (Brid.) Crum - **Lincoln**: Cuivre River State Park, Allen 7833.

***Platygyrium repens*** (Brid.) Schimp. in B.S.G.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2338. **Mississippi**: Big Oak Tree State Park, Allen 17125.

***Pylaisiella selwynii*** (Kindb.) Crum et al.- **Monroe**: Hwy 15 river access near Paris, Darigo 2249a. **Lincoln**: Cuivre River State Park, Feigley. **Oregon**: Turner Spring Recreation Area, Allen 17100.

***Taxiphyllum taxirameum*** (Mitt.) Fleisch.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2317. **Lincoln**: Cuivre River State Park, Schuette 2660.

## LESKEACEAE

***Haplocladium microphyllum*** (Hedw.) Broth.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2315. **Shelby**: Oxbow Nature Trail near Bethel, Darigo & Vanderbilt 2304.

***H. virginianum*** (Brid.) Wat. & Iwats.- **Lincoln**: Cuivre River State Park, Darigo & Darigo 2504.

***Leskea australis*** Sharp - **Mississippi**: Big Oak Tree State Park, Allen 17131. First report in Mississippi Lowlands; known only from three other counties in Missouri and listed as Endangered in Missouri.

***L. gracilescens*** Hedw.- **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2344. **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt

2254. **Montgomery**: Graham Cave State Park, Feigley. **Randolph**: Clark city park, Darigo 2399. **Oregon**: Turner Spring Recreation Area, Allen 17103. **Mississippi**: Big Oak Tree State Park, Allen 17143a.

***L. obscura*** Hedw.- **Mississippi**: Big Oak Tree State Park, Allen 17146. First report of the species in Mississippi Lowlands.

***Lindbergia brachyptera*** (Mitt.) Kindb.- **Holt**: Big Lake State Park, Darigo & Darigo 2579. **Lincoln**: B. K. Leach Conservation Area, Darigo & Darigo 2453a. **St. Louis**: Babler State Park, Darigo 2496.

### LEUCOBRYACEAE

***Leucobryum glaucum*** (Hedw.) Angstr. in Fries - **Montgomery**: Graham Cave State Park, Feigley. **Carter**: Peck Ranch Conservation Area, Darigo 2163.

### LEUCODONTACEAE

***Leucodon julaceus*** (Hedw.) Sull.- **Lincoln**: Cuivre River State Park, Feigley. **St. Charles**: A. A. Busch Conservation Area, Darigo 2477.

### MNIACEAE

***Plagiomnium ciliare*** (C. Mull.) T. Kop.- **Montgomery**: Graham Cave State Park, Feigley. **Reynolds**: Taum Sauk Creek, near Taum Sauk Cemetery, Darigo & Sullivan 2566.

***P. cuspidatum*** (Hedw.) T. Kop.- **Putnam**: Rebel's Cove Conservation Area, Darigo & Sullivan 2380. **Schuyler**: Rebel's Cove Conservation Area, Darigo & Vanderbilt 2335. **Montgomery**: near Mineola, Redfearn & Key 27759. **Mississippi**: Big Oak Tree State Park, Allen 17137.

***Rhizomnium punctatum*** (Hedw.) T. Kop.- **Lincoln**: Koenig Property near Argentville, Darigo & Vanderbilt 2474

### ORTHOTRICHACEAE

***Drummondia prorepens*** (Hedw.) Britt.- **Warren**: Koenig Property near Jonesburg, Darigo & Vanderbilt 2083.

***Orthotrichum pusillum*** Mitt.- **Lincoln**: B. K. Leach Conservation Area, Darigo & Darigo 2454. **St. Charles**: A. A. Busch Conservation Area, Darigo 2478. **St. Louis**: Babler State Park, Darigo 2497. **Butler**: Allred Lake Natural Area, Allen 17110.

***O. stellatum*** Brid. - **Lincoln**: Cuivre River State Park, Feigley. Common, but represents the first report in a Border county and the northernmost station for this species in Missouri.

***O. strangulatum*** P. Beauv.-**Lincoln**: Cuivre River State Park, Allen 4811.

POLYTRICHACEAE

***Atrichum angustatum*** (Brid.) Bruch & Schimp. in B.S.G.- **Clark**: Battle of Athens State Park, Darigo & Vanderbilt 2280. **Macon**: Atlanta-Long Branch Conservation Area, Darigo & Sullivan 2384. **Shelby**: near Cherry Box, Darigo & Vanderbilt 2290. **Montgomery**: Graham Cave State Park, Feigley.

***Polytrichum commune*** Hedw. var. ***commune*** - **Shelby**: Oxbow Nature Trail near Bethel,Darigo & Vanderbilt 2306.

***P. ohioense*** Ren. & Card.- **Montgomery**: Graham Cave State Park, Darigo & Darigo 2191.

POTTIACEAE

***Astomum muehlenbergianum*** (Sw.) Grout - **Lincoln**: Cuivre River State Park, Schuette 2664. Common, but first report in a Border county.

***Barbula convoluta*** Hedw.- **Iron**: Taum Sauk Mountain State Park, Allen 17044. Known from only three other Missouri counties; first report in St. Francois Mountains and listed as Rare in Missouri.

***B. unguiculata*** Hedw.- **Platte**: Weston Bend State Park, Darigo & Darigo 2602. **Lincoln**: Cuivre River State Park, Darigo & Darigo 2425. **Carter**: Peck Ranch Conservation Area, Darigo 2161. **St. Francois**: St. Francois State Park, Darigo 2389. **Washington**: Washington State Park, Darigo 2508. ***Gymnostomum aeruginosum*** Sm.- **Lincoln**: Cuivre River State Park, Feigley.

***Phascum cuspidatum*** Hedw.- **St. Charles**: A. A. Busch Conservation Area, Darigo & Darigo 2460. **Butler**: Allred Lake Natural Area, Allen 17112. Uncommon.

***Syntrichia pagorum*** (Milde) Amann- **Butler**: Allred Lake Natural Area, Allen 17104.

***Tortella humilis*** (Hedw.) Jenn.-**Lincoln**: Cuivre River State Park,Allen 7830.

***T. plinthobia*** (Sull. & Lesq.) Aust.- **Lincoln**: County Rd 925 near Foley, Darigo 2440.

***Weissia controversa*** Hedw.- **Scotland**: Hwy 15 rest stop, Darigo & Vanderbilt 2253. **Montgomery**: Graham Cave State Park,Fiegley.

SEMATOPHYLLACEAE

***Sematophyllum adnatum*** (Michx.) Britt.- **St. Charles**: A. A. Busch Conservation Area, Darigo & Darigo 2462. Uncommon.

THELIACEAE

***Thelia asprella*** Sull. in Sull. & Lesq.- **Audrain**: Marshall Diggs Conservation Area, Darigo 2245.

***T. lescurii*** Sull. in Sull. & Lesq.- **Iron**: Taum Sauk Mountain State Park, Allen 17049.

THUIDIACEAE

***Thuidium delicatulum*** (Hedw.) Schimp. in B.S.G.- **Montgomery**: Graham Cave State Park, Feigley.

***T. recognitum*** (Hedw.) Lindb.- **Shelby**: Oxbow Nature Trail near Bethel, Darigo & Vanderbilt 2305.

**Acknowledgments**: The author wishes to thank William Buck for granting permission to publish his ***Micromitrium*** collection, and also the following: Father James Sullivan and other Webster Groves Nature Study Society members for their stimulating outings, Bruce Allen, Dolly Darigo, Greg Pedano and Paul Redfearn for allowing me to publish on their collections, Virginia Bryan for furnishing ***Micromitrium meglasporum*** range data, Bruce Schuette for furnshing his and Margaret Feigley's collections for analysis, Sue Vanderbilt for her inspired collecting help, and Bruce Allen for sharing his time and expertise.

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Redfearn Jr., Paul L. 1983. *Mosses of the Interior Highlands of North America.* Reprinted with Changes and Additions [Annals of the Missouri Botanical Garden 59 1972: 1-104. 1972 (Second Printing)].

# The Selection of *Sphagnum* for Diapers by Indigenous North Americans

Leslie M. Johnson Gottesfeld[1] & Dale H. Vitt [2]

ABSTRACT. *Consultation with elders from the Wet'suwet'en and Gitksan peoples of northwestern British Columbia, Canada, revealed that morphological attributes of* Sphagnum *are used to select proper moss material for use as diapers. Long, pink (non-red) material of* S. magellanicum *was considered as correct for diapers while several other mosses, as well as the short, yellow-green and red* Sphagna *were considered inappropriate. A review of the literature suggests that red* Sphagna *are avoided by several indigenous groups for diapering needs.*

*Sphagnum* has unique properties that have long been recognized as environmentally and economically important (Richardson 1981). *Sphagnum* is present in large quantities in northern bogs and poor fens; it has the ability to exchange hydrogen ions for base cations, thus acidifying its' surroundings; and it holds large quantities of liquid, often between 15 and 22 times its dry weight. These properties are ecologically important in the reduction of rates of decomposition that allows *Sphagnum*-dominated peatlands to sequester large amounts of carbon. *Sphagnum* also has been utilized economically through the production of soil amendments and absorptive board. The ability of *Sphagnum* to hold large amounts of liquid and to provide a rather sterile medium has long been recognized by native peoples around the northern hemisphere. The Inuit used it to pad their sealskin boots and for diapers (Crum 1973, Richardson 1981). *Sphagnum* was also used by European and North American troops as a dressing during World War I (Hotson 1918, 1919, 1921; Nichols 1918a, 1918b, 1920; Thieret 1956).

It has been widely reported in ethnographic and ethnobotanic literature that *Sphagnum* moss has been used by various North American indigenous peoples for diapering infants and for menstrual needs, (Central Carrier Linguistic Committee 1973; Clément 1990; Gunther 1973; Kari 1887; Leighton 1985; Marles 1984; Turner 1979; Turner et al. 1983).

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## USE BY THE WET'SUWET'EN AND GITKSAN PEOPLES

The Wet'suwet'en and Gitksan peoples of northwestern British Columbia are among the groups who still use *Sphagnum* for such purposes (Johnson Gottesfeld 1994). Reportedly large quantities of **yin**, or 'diaper moss' were gathered every fall, for example the Wet'suwet'en, cleaned, dried, and stored it for winter use.

> "...we're talking about diapers moss, Jean. Even I used it from the start, eh. They're so nice. When you first pull them out of the swamp. Oh, some of them be that long, nice and white, you know. You have to pick them up from the swamps where the cranberries grow. We go to pick cranberries and put up the moss the same time. And come back and pick–hang them on the trees, so all the bugs, whatever, would leave it. It's a nice warm place for them, I guess. There's not very many, eh, but they all, after they all leave we go back and get our backpacks and haul them all out. Whole winter's supply. Oh, it's beautiful, yeah. Really beautiful." (Elsie Tait interview transcript 8/11/95).

The Gitksan also gather moss from 'swamps' for diapering infants (Olive Ryan interview transcripts 7/25/95 and 8/4/95).

Ethnobotanical research, however, reveal that not all species of Sphagnum are considered suitable for such purposes.

> "**yintl'akh yil.** That's 'pampers'. This moss [a short green Sphagnum] is not right. The right one looks like blankets. They dry it hung up on trees. Where they get it is swamp." (Lizette Naziel interview notes 10/20/87).
>
> "A pale green Sphagnum about 6 inches long. **yin yil**. This is not the diaper moss. The diaper moss is **yin**. It is about 20 inches long." [Lizette indicates this by gesturing]. (Lizette Naziel interview notes 10/3/88).
>
> "**yin** moss diapers. Madeline used them right through Christina. Wash the moss and hang it out. **yin** (white). You can gather it at Springhill (Telkwa highroad halfway to Smithers). Gather it when it is 14-16" long. Not the short ones. Not the green. Pampers are called "Nido yin" ('Whiteman's moss') because you use them and throw them away." (Madeline Alfred interview notes 4/19/88).

The correct diaper moss was said by Wet'suwet'en informants to be about 20 inches (50 cm) long, pale in color, and to be found in 'swamps' [yi'n k'e't]. Various efforts to locate material of *Sphagnum* matching this description in peatlands of the Bulkley Valley and Hazelton areas of British Columbia during the 1988-91 field seasons failed to turn up an appropriate candidates. In summer of 1995, material of a pale species of *Sphagnum* about 27 cm in length was collected in a small fen adjacent to South Hazelton, British Columbia (55° 14'N; 127° 39'W). The fen is dominated by *Andromeda polifolia, Betula papyrifera, Ledum groenlandicum, Menyanthes trifoliata, Picea mariana, Rubus chamaemorus, Salix pedicellaris, and Vaccinium oxycoccos.* The slightly pinkish *Sphagnum* was collected from the top of a hummock among *Ledum groenlandicum* shoots.

Specimens of the *Sphagnum* moss were collected, and shown to three Wet'suwet'en elders and one Gitksan elder, all of whom confirmed that this was 'diaper moss'. Pat and Lucy Namox, Wet'suwet'en elders, commented that the moss they had collected in the past was even longer, approximately 40-45 cm in length. Olive Ryan, the Gitksan elder, commented that several other mosses collected in the fen that were green and dark red in color, and approximately 10-12 cm in length were not the right 'swamp' moss; they were not good for diapers because they were 'dirty' (Olive Ryan interview transcript 8/4/95). The 'diaper moss' from South Hazelton is well developed, pinkish *Sphagnum magellanicum* (specimen Gottesfeld s.n., deposited in ALTA). The other mosses collected at the site are *S. angustifolium* and short, red *S. magellanicum* as well as *Aulacomnium palustre* and *Tomenthypnum nitens.*

## USE BY OTHER INDIGENOUS PEOPLES

Several reports of the use of *Sphagnum* for diapering and other purposes have appeared in ethnobotanical literature (Table 1) and Leighton (1985) described criteria employed by the Woods Cree for deciding which moss is suitable, and which should be rejected:

> "A red form of *Sphagnum nemoreum*, called **miskwaskamikwa** or **i-mithkwaki askīya** in Cree was avoided because it caused irritation to the skin. *Sphagnum warnstorfii*, collected from wet depressions in the muskeg was also avoided because, the respondents claimed, it was less absorbent than the other mosses collected. *Sphagnum nemoreum*, without the reddish color was used in the same way as *S. fuscum*. The choice of *Sphagnum* species collected for diapers is more likely based on gross morphological differences such as growth habit, than on

> microscopic species distinctions. This was suggested by R. E. Andrus (pers. comm.) who pointed out that *S. warnstorfii* occurs in hummocks as well as wet depressions, and in hummocks it is difficult to distinguish from *S. fuscum*. Women collecting moss did take it by handfuls from hummocks, and although there was no *S. warnstorfii* in the samples collected it seems unlikely that they would separate this species from other hummock formers while collecting moss for diapers." (Leighton 1985).

The Chipewyan also apparently use both *S. fuscum* and *S. nemoreum* (as well, perhaps, as other species of pale or yellow coloration) for diapers, and they, like the Woods Cree, reportedly avoid the use of red sphagna for these purposes, because they believe that it will cause skin irritation. The Carrier people of north-central British Columbia also claim that red *Sphagnum* will cause sores and avoid its use for diapers (Central Carrier Linguistic Committee 1973); although species are not reported. One Wet'suwet'en respondant volunteered similar information regarding using red moss for diapers. However, red sphagna are reported to have medicinal uses among the Montagnais for hot compresses in case of fever or chills, or 'paralysis' (Clement 1990).

Large pale colored sphagna from the tops of hummocks seem to have been widely employed by indigenous peoples of North America for diapers, menstrual supplies, and similar sanitary needs. Evidence suggests that gross physical characteristics of the mosses determine their being chosen for these uses, with different taxa of similar physical characteristics chosen in different geographic areas. Avoidance of distinctly red sphagna for these purposes also seems to be widespread, however the pink colored*S. magellanicum* seems satisfactory.

*Sphagnum* moss is generally reported to be superior to cloth diapers for preventing diaper rash based on informants from several cultural groups (Johnson Gottesfeld field notes; Marles 1984). Careful disposal of unclean diaper material was considered important by Wet'suwet'en and Gitksan consultants, consistent with cultural emphasis on avoiding contamination by unclean substances such as feces or menstrual blood.

**Acknowledgments.** We would like to thank the Wetsuwet'en and Gitksan elders Lizette Naziel, the late Madeline Alfred, Pat Namox, Lucy Namox, Louise Pierre, and Elsie Tait [Wet'suwet'en], and Olive Ryan [Gitksan] for sharing information about diaper moss. We also acknowledge the Canadian Circumpolar Institute for field support in the summer of 1995 for LJG and the Natural Sciences and Engineering Research Council of Canada for Research Grant A6390 to DHV.

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## ADDENDA

In the paper "Mosses of Albany County, Wyoming" of *Evansia* by P. M. Eckel (Vol. 13(2) 1996) the following acknowledgments were not included with the manuscript submitted. The information published was considerably improved by the inclusion of specimens collected in 1993 by Bill Buck, Norton Miller and Bill Reese and generously shared with the author. Full sets of this material are at NY, NYS and LAF respectively, with broken sets at BUF and RM.

# Desert Sposs: a tool, and notes on collecting bryophytes in arid regions

P. M. Eckel[1]

After several seasons collecting bryophytes in the American southwest, the desert regions of northern Mexico and the arid intermontain areas west of the Great Plains region I have discovered certain strategems that may be of use to other collectors, especially those whose primary residence is in the shady, humid, Eastern Deciduous Forest.

The first adjustment is abandonment of the knife as a tool for collecting. Perhaps many readers have attended field trips with other bryologists and admired all the various knives in use: pearl-handled, retractable or not, dangling from elaborate knotted lanyards on belts, bear-skinner knives in leather sheathes, or dollar folding affairs, several varieties of which I had brought with me on my first trip. After cutting myself when folding them up, sitting on them, gouging myself while falling down loose talus slopes, tediously opening and shutting them as I moved from one likely habitat to another perched over steep declivities, but most especially, prying plants from vugs in stone and having plants blow away in the constant wind, trying to navigate the plants on the pointy thin tip of the flat blade safely into a shuddering paper bag while on the constant lookout for biting denizens of the desert on a disintegrating talus slope - I was prepared for a happy inspiration.

Which came when the knives were all lost, and also the sunglasses, pens and other paraphernalia through inadvertance, and all that was left was the kitchen kit with the knife, fork and spoon. Soon only the spoon was left and then the revolution happened. I could fall on the spoon and not damage myself (so easily), mosses fairly leaped off broiling hot ledges in withering winds into the boss of the spoon and huddled there safely and intact until deposited in their packets. With mounting enthusiasm, I discovered that long-handled cooking spoons to 12 inches with six inch long bosses were ideal for scooping material out from moist, shaded recesses under frying, glaring boulders fronted by cactus and other tearing vegetation or dense Artemisia bushes. Snakes and other gouging animals enjoy the same sanctuary as do mosses at the same time of day that any Easterner in his right mind would be out collecting (earliest morning), and, with the long spoon, one avoids the necessity of extending one's hand into such tempting recesses. Using a knife seems to compound the folly. Scoops of discovery can be had this way, the plants lying intact in unbroken colonies where they can be comfortably examined for fruit with the hand lens before stowing - this is especially so when lifting fragile desert crusts that turn to powder at a touch, or removing *Grimmia* and *Orthotrichum* cushions from stony ledges in late afternoon hot winds. Fingers are less often scorched by too frequent contact with rocks white with heat.

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[1] Clinton Herbarium, Buffalo Museum of Science, 1020 Humboldt Parkway, Buffalo, NY 14211

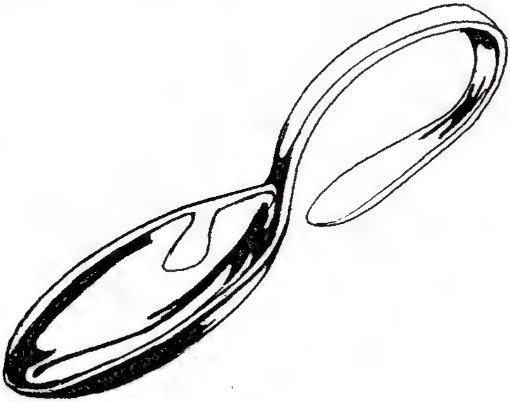
One less opportunity to be pricked, stung, cut or gored in the field is welcome. Sturdy cooking spoons may be used to hold tearing bushes away from one's body while negotiating narrow declivities. They can be used to press, like a little walking stick, against glass-sharp basalt outcrops to prevent one's blouse and flesh from abrading on them, or by touching them to steady one when they appear to be scorching. I have used a long spoon to help myself climb out of a tar pit that seemed good walking before the sun came over the ridge at 10 AM. I learned how useful they came to be to remove the joints of what are called Jumping Chollas after they become embedded in one's arm.

Another useful device, discovered by accident, is a flat bag made of heavy, flexible plastic: Naugahyde is perfect. Filled with empty packets in the morning, it soon plumps out with specimens making a pillow to sit on whenever a need to sit overtakes one, or when the only way down a steep slope is on the rear end. Lava rocks will quickly take the seat of one's pants off, and the bag avoids innumerable opportunities for puncture, as from drill grasses. The bag will also serve as a shield, for example, in declivities choked with cactus, and with which the cactus may be held away from the body. It can be lain over the barbed wire that makes access nearly impossible in many places out West, which is also tetanus-country. No back-pack can beat it.

I have found a small, collapsible umbrella of immense value, especially when collecting is in exposed areas and the shade is gone at 10AM and you find yourself halfway up an open mountainside. Between the intense sun overhead and the white glare radiating off the ground at ones feet, stress can reach crisis levels before shade is attained - an umbrella at least keeps direct light off the body.

Sunglasses with string tied to the ends and with flip-up visors avoid loss and tedious donning and doffing, as do 'click' pens, rather than those with removable caps. Care must be had with hand lenses dangling from the neck to avoid executing oneself in free fall down brushy slopes. Tough leather boots to the knee are indispensible as are cool cotton gloves for the hands and a hat with a good brim to reduce glare. Water is essential as dehydration is constant, and is useful to sprinkle on unpromising ledges whose bryophytes resemble their stony background until they bloom with moisture.

The special conditions for collecting bryophytes in the desert that vascular plants do not require is due to the greater environmental intimacy demanded of the explorer, especially exposing the face and eyes often within inches of the substrate, aggravated even more for those who squint due to imperfect vision. The spoon allows greater distance between the face and desert animals.



It is nice to collect alone and not have anyone startle you suddenly by shouting things at you about black widow spiders and snakes you almost stepped on. Upon returning home, my husband shared my enthusiasm and, not to be outdone, invented the Sposs, together with its name. A sposs is a spoon whose solid metal handle is bent back in a graceful loop that makes it comfortable to carry, easy to attach to a belt or loop, easy to distinguish from legitimate kitchen utensils, and has fewer feminine associations. Spoons, unlike knives, can be bent and still be useful. Antique spoons can be readily had at charity second hand stores. When the handle is bent back it makes the ornate ends more prominent and attractive. The edges can be made more efficient by grinding with a stone wheel or file to a dull-knife keenness. You will not be stopped at the airport for carrying knives on the plane - a serious inconvenience at times - or challenged by the border patrols of Mexico and Canada, nor can a spoon be turned against you.

# The Genus *Mielichhoferia* in Maine

Bruce Allen[1]

*Mielichhoferia* is a mostly tropical genus of about 70 species. Many of these are poorly understood with perhaps only twenty of them having been recently evaluated. The genus also has a few wide-ranging species found in the temperate or arctic regions of the Northern Hemisphere.

With the Bryaceae, *Mielichhoferia* along with *Schizymenium* and *Synthetodontium* constitute the subfamily Mielichhoferioideae. This subfamily of the Bryaceae is very close to the Pohlioideae: both have lanceolate leaves, long leaf cells and costa generally percurrent to subpercurrent (Shaw & Crum 1982). The Mielichhoferioideae are usually characterized by having lateral inflorescences and various degrees of peristomal reduction. But, as noted by Shaw (1987) some species of the Mielichhoferioideae have terminal inflorescences, and while some species of *Pohlia* have highly reduced peristomes some species of *Schizymenium* and *Synthetodontium* have relatively well developed double peristomes. Shaw (1987) has also found that the Pohlioideae and the Mielichhoferioideae differ in perichaetial leaf morphology. In the Pohlioideae the outer perichaetial leaves tend to be larger with more strongly serrate margins, stronger costae and longer leaf cells than the vegetative leaves. In the Mielichhoferioideae on the other hand the perichaetial leaves are smaller, have weaker, shorter costae, entire or nearly entire margins and shorter, boarder, often thinner-walled leaf cells than the vegetative leaves.

In *Mielichhoferia* the plants are dioicous and the peristome usually has long exostome teeth with a rudimentary endostome that barely exceeds the capsule mouth. Occasionally the peristome is single and exostomial in origin and rarely it is absent. *Schizymenium* is paroicous, autoicous, or synoicous with the peristome commonly single and endostomial in origin, occasionally it is absent. In *Synthetodontium* the plants are dioicous, both parts of the peristome are well-developed, and the endostome adheres to the exostome. The exostome teeth are long and the endostome reaches 1/2-2/3 the length of the exostome teeth. (Shaw 1985, 1985a).

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[1] Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299.

***Mielichhoferia*** Hornsch. & Sturm, Bryol. Germ. 2(2): 179.1831.

Plants small in loose or dense, usually yellowish tufts. Stems simple, forked, or sparsely and irregularly branched. Leaves erect to erect-spreading wet or dry, ovate to linear-lanceolate, acute or acuminate; margins plane or narrowly recurved, usually serrulate; cells smooth, firm or lax-walled, elongate-rhomboidal above, short-rectangular below, subquadrate at the basal margins; costa strong, subpercurrent to percurrent. Perigonia and perichaetia lateral, paraphyses none or few. Setae elongate, flexuous. Capsules pyriform to subcylindric, erect to inclined, smooth, neck well-developed; operculum conic-convex, apiculate; annulus large, compound, deciduous; stomata superficial; peristome single or double (rarely absent), exostome of 16 linear teeth, endostome (when present) with basal membrane scarcely exceeding the capsule mouth and often fused to the exostome teeth, segments and cilia absent. Calyptrae small, cucullate, smooth, naked. Spores spherical.

*Mielichhoferia elongata* (Hoppe & Hornsch.) Hornsch., Bryol. Germ. 186. 1831.

Plants small, densely tufted, glaucous bluish-green when fresh, shiny greenish-yellow above, brownish below when dried, to 5 mm high; with reddish-brown, smooth rhizoids. Leaves 0.4--0.8 mm long, erect dry, erect-spreading wet, narrowly ovate to lanceolate, apex acute, margins plane, serrulate, not bordered; costa subpercurrent, serrulate at back near apex; upper leaf cells 50--70 x 10 μm elongate-rhomboidal to fusiform, firm-walled, basal cells 40 x 14 μm, short-rectangular, the basal margins with a few subquadrate cells, 16 x 14 μm. Dioicous. Perigonia lateral on stem, small, gemmiform. Perichaetia not seen. Sporophytes not known from Maine.

On bare soil below overhanging cliff ledge. In Maine known from Oxford (**Allen 16681A**, DUKE, MICH, MO, NY, US) county.

*Mielichhoferia elongata* is one of the "copper mosses", a small group of bryophytes with an affinity for copper (or other metal) bearing substrates. The species was first collected in Maine by C. D. Adams (**Parlin 14178** MAINE) at Roxbury Notch, Oxford county. The only other Maine collection of *M. elongata* (**Allen 16681A**) came from the same locality. This latter collection was made on the northwest side of the notch just below the summit of Partridge Peak. The plants were growing on bare soil under projecting cliff ledges, more or less shaded from direct sunlight. The plants are very small and when fresh the growing leaves

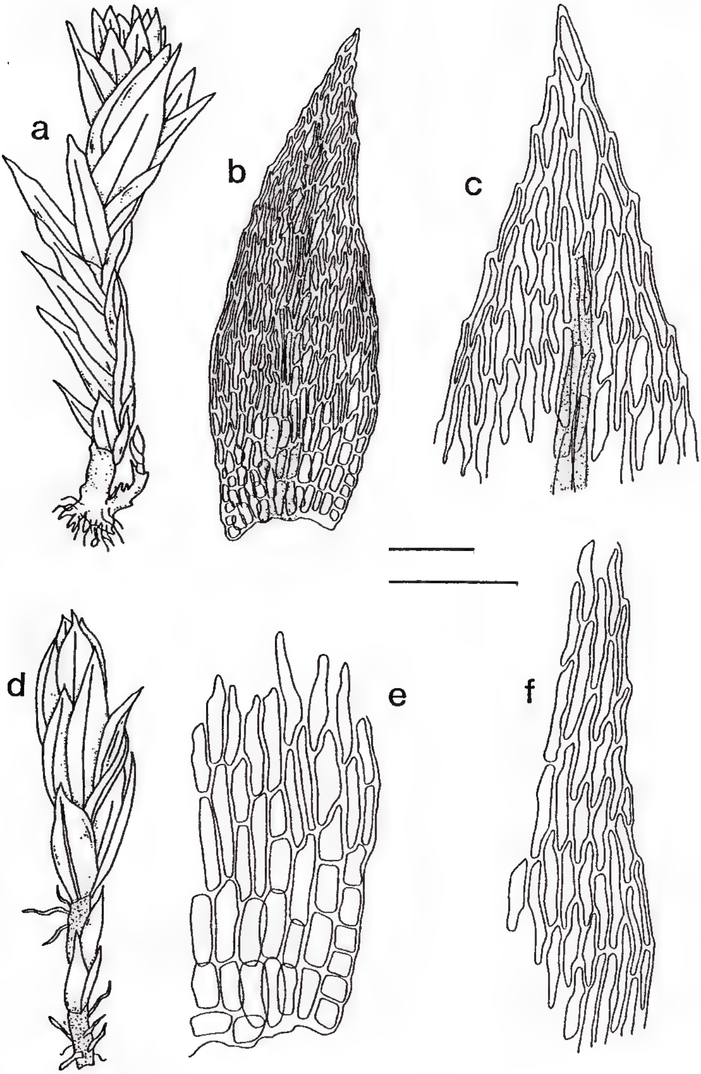

Figure 1. *Mielichhoferia elongata*. a. & d. Habit. b. Leaf. c. Leaf apex. e. Basal leaf cells. f. Median leaf cells at margin. Scales in mm: Bar 1 = 0.1 (c,e,f); Bar 1 = 0.2 (b); Bar 2 = 0.5 (a,d). All figures drawn from *C. D. Adams* [Parlin 14178] (MAINE).

have a glaucous, bluish-green color which is lost on drying. Dry plants are characteristically shiny and yellowish-green above and brown below. The leaves are small and narrowly ovate to lanceolate, with serrulate margins and a subpercurrent costa. The leaf cells are elongate rhomboidal above and short rectangular below with a few subquadrate cells at the basal margins.

Gametophytically *Mielichhoferia elongata* is very much like a *Pohlia* and since Maine material lacks sporophytes it is likely to be confused with that genus. In the field, its small size, densely tufted habit, and especially its glaucous, bluish-green color help in recognizing it. Microscopically, only the presence of lateral perigonia will aid in its identification. The species has been treated as a synonym of *M. mielichhoferiana* (Crum & Anderson 1981, Shaw & Crum 1984), but more recently it has been shown the two are distinct on the basis of their isozyme profiles (Shaw & Rooks 1994) and morphologically by the shorter, broader leaves, narrower costa, and longer, broader leaf cells of *M. elongata* (Shaw 1994). Nevertheless, the two species are so close they can hybridize and produce fully viable offspring (Shaw 1994a).

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# Notes on *Isothecium myosuroides* and *I. obtusatulum* (Musci: Brachytheciaceae) in western North America

Bruce Allen and Alan Whittemore[1]

*Isothecium myosuroides* Brid. is a widespread species of the north temperate zone. It is found on all northern continents, most commonly in coastal areas and it is absent from interior areas with strongly continental climates. It is widespread throughout Europe where it occurs from Iceland east to the Murmansk area of Russia, south to the Mediterranean region, and west to the Baltic States, Carpathian Mountains, and the Caucasus. In Africa it is known from Macaronesia and Algeria. In Asia, it has been reported from eastern China and Taiwan, and specimens from Japan named as *Isothecium subdiversiforme* Broth. seem identical to *I. myosuroides*. In eastern North America *I. myosuroides* is uncommon and has a discontinuous distribution, occurring in coastal regions from Newfoundland south (Prince Edward Island, Macoun *Canadian Musci 351*, MO) to Maine, in the mountains of New Hampshire and along the North Carolina--Tennessee border, and on the north shore of Lake Superior in Ontario. In western North America, the species is widespread and common along the coast from the Aleutian Islands south to Guadelupe Island, Baja California, inland to southwestern Alberta (*Schofield 44348*, MO), Montana, and the Sierra Nevada of California. The western North American plant has usually been treated as a distinct species, *I. stoloniferum* Brid., but this species cannot be maintained, since many forms from this region are identical to European and eastern North American forms of *I. myosuroides* (Allen 1983).

Although *I. myosuroides* is a stenotypic species in eastern North America, it is strikingly polymorphic throughout the western North American part of its range. It has a very broad ecological amplitude in this area, growing on rock, the trunks or branches of trees, or decaying wood, in habitats varying from extremely humid to rather dry. The plants typically have creeping stems that give rise to erect, stipitate plants, but there is much variation in gross morphology, especially in growth form. There are three major expressions in western North America: the rather julaceous *myurellum* morphotype, the robust *cardotii* morphotype, and the stoloniferous *spiculiferum* (or *stoloniferum*) morphotype. The remarkable high level of

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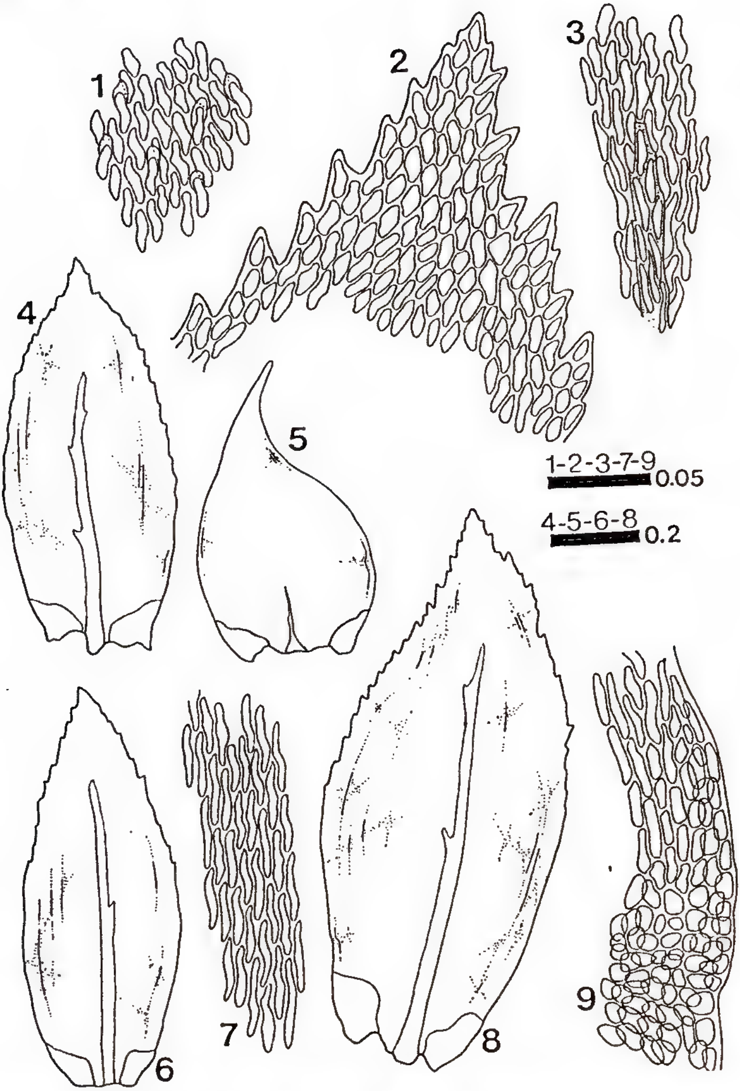
[1] Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166-0299



Figures 1--9 *Isothecium obtusatulum* Kindb. 1. Upper dorsal leaf cells. 2. Leaf apex. 3. Upper leaf cells and costa at tip showing projecting spines. 4, 6, 8. Branch leaves. 5. Stipe leaf. 7. Basal leaf cells. 9. Alar region of leaf. All scales in mm. All figures from *Whittemore 3328* (MO).

variability exhibited by this species in western North America suggests that the taxonomy of the species is still not fully resolved and a thorough examination of the variation exhibited by *Isothecium myosuroides* in western North American is needed.

A fourth western North American morphotype in the *I. myosuroides* complex, which includes the type of *I. obtusatulum* Kindb., was noted by Crum (1987). Despite the overall variability of the complex, this morphotype is recognizable by a combination of several character-states that are rare or absent in *I. myosuroides* proper. In many ways, it is more distinctive than any of the recognized phases that are commonly recognized in the literature. We are not willing to make formal taxonomic changes without a complete study of the complex as a whole, but we would like to draw the attention of future workers on the complex to the characters of this morphotype.

*Isothecium myosuroides* Brid. morphotype *obtusatulum*

*Isothecium obtusatulum* Kindb., Rev. Bryol. 22: 83. 1895. Protologue: Canada. On rocks. Amer. Canada, Vancouver island (1893): *Macoun*; *Roell* (1888).

Plants with creeping primary stems and ascending, pinnately branched aerial stems. Primary stems and stipe-like bases of aerial stems with leaves small, distant, strongly spreading to squarrose, acuminate. Aerial stems and branches often compressed, leaves large, imbricate, narrowly elliptical to lance-ovate or lanceolate, apex broadly acute to slenderly acuminate; upper leaf cells short (ca 3:1), often with distal ends of some cells projecting adaxially as large spines, sometimes these projecting cells overlap the adjacent cell so the papillae form scattered bistratose spots one cell across; margins strongly singly or doubly serrate, teeth mostly 2 or 3 celled; costa single, strong, ca 2/3 of leaf length, sometimes tapered distally, often spurred along its length, ending in one or more large adaxial spines; alar region small, sharply set off from leaf cells. Leaves of the aerial stems 1.2-2.0 mm long; branch leaves are 0.6-1.2 mm long. Sporophyte the same as in I. myosuroides

On exposed, damp rock or dry boulders and fallen logs in British Columbia (*Macoun 126*, CANM) and California (Marin Co., *Schofield 16860*, Contra Costa Co., *Flowers 4134*; San Mateo Co.,*Whittemore 3328*, all MO).

The *obtusatulum* morphotype differs from *I. myosuroides* in a number of characters. Most expressions of *I. myosuroides* are larger than the *obtusatulum* morphotype; the stem leaves in *I. myosuroides* reach 3.65 mm long, and the branch leaves reach 3.0 mm long (Allen 1983). In *I. myosuroides* the stem leaves are very variable with some specimens having stem leaves similar to those of the morphotype, but in others they are scarcely differentiated and spread at a moderate angle; the shoots in *I. myosuroides* are less often compressed, the leaf cells are longer, the leaf margins usually have single celled teeth, and the costa always tapers distally, is never laterally spurred, and usually lacks apical spines. The *obtusatulum* morphotype also bears a close resemblance to *Isothecium howei* Kindb. in aspect, plant size, costal form, marginal leaf serration, and leaf cell size and papillosity. *Isothecium howei* is presently in the synonymy of *I. cristatum* (Hampe) Robins., but should be evaluated in conjunction with any study on the *obtusatulum* morphotype.

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Allen, B. H. 1983. *Isothecium myosuroides* Brid. and *I. stoloniferum* Brid.: A quantitative study. Bryologist 86: 358--364.

Crum, H. 1987. *Bestia, Tripterocladium,* and *Isothecium*: an explication of relationships. Bryologist 90: 40--42.

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## California Lichen Society and the Northwest Lichen Guild

Fall Excursion, October 19 & 20, 1996
Base: Brookings, OR
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## AMERICAN BRYOLOGICAL AND LICHENOLOGICAL SOCIETY NOMINATION FORM

In accordance with Article 1 of the bylaws (Election of Officers), the Election Committee is to prepare a**slate of candidates**for each vacant office in ABLS.

The officers to be filled are the **President-Elect** (a lichenologist this time, according to the convention of alternating specialties in alternate terms), and three **Members-at-Large**. The President-elect serves for two years, and his/her term would begin in August, 1997. When the final ballot is prepared, there will be two candidates for President-elect, and two for each of the three positions of Member-at Large.

The Elections Committee requests that the membership submit nominations for these offices, listed below, to the Chair of the Election Committee. The deadline for such Nominations is March 1, but DO IT NOW, while you have the nomination form in your hand.

Respectfully submitted by the Nominations Committee,
Shirley C. Tucker, Chairman; Roger Rosentreter, Barbara Thiers

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>*<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

I nominate ____________________________ for President-Elect for 1997-1999

I nominate __________________________________ for Member-at-Large

__________________________________ for Member-at-Large

__________________________________ for Member-at-Large

Lists of current office-holders can be found inside the front cover of *The Bryologist.* Past presidents since 1976 include: Ronald A. Pursell, Irwin M. Brodo, William D. Reese, Thomas S. Nash III, Clifford M. Wetmore, Norton G. Miller, William L. Culberson, Dale H. Vitt, Vernon Ahmadjian, Barbara Crandall Stotler, and Chicita F. Culberson.

**Return this nomination form by March 1, 1997 to:**
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Dept. of Biology (EEMB), University of California, Santa Barbara
Santa Barbara, CA 93106
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# EVANSIA

Volume 13 Number 4

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BOTANICAL GARDEN

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ISSN 0747-9859

*Evansia* volume 13, number 3 was mailed on 24 September 1996

# The genus *Hypnum* (Hypnaceae: Musci) in Maine

Bruce Allen [1]

The genus *Hypnum*, with approximately 48 species (Ando 1972), is found throughout the world. It is one of the most common woodland species in Maine, and often occurs in dense mats completely covering boulders, vertical rock faces, fallen logs or square yards on the forest floor. *Hypnum* was used by Dillenius (1719, as *Hypnon*), and is one of the genera originally treated by Hedwig (1801). It is now being monographed in exquisite detail by Ando (1972a, 1973, 1976, 1986, 1987, 1989, 1990, 1992, 1993, 1996). The concept of the genus has changed considerably over time as segregate genera have been removed from it. At present it is characterized by its creeping stems (often with regularly pinnate branching) variously dimorphic branch and stem leaves, usually complanate and falcate-secund leaves with short, double costae, long-linear leaf cells, differentiated alar cells, long setae, inclined and asymmetric capsules, double, (generally perfect) peristome, and cucullate calyptrae. *Hypnum* has a distinctive appearance, with most plants having a shiny, yellow-green color, dense branching pattern and complanate, falcate-secund leaves that give the plants a braided appearance. The genus is variable in a number of minor taxonomic characters (pseudoparaphyllia form, axillary hair form, perichaetial leaf texture, endostomal cilia, capsule texture) that are useful in delimiting species-pairs. They may also be important in establishing sectional lines, but their use in supporting additional segregate genera (see Hedenäs 1990) is suspect due in part to their high level of homoplasy.

***Hypnum*** Hedw., Sp. Musc. Frond. 236. 1801.

Plants small to robust, green, golden, yellowish-brown, reddish-yellow, in loose or dense, tufts or mats, occasionally pendent. Stems creeping, ascending, suberect, or erect, regularly pinnate or irregularly branched; in cross-section with or without a hylodermis, central strand present or

---

[1] Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri, 63166.

rudimentary, rhizoids in abaxial clusters at leaf base. Paraphyllia absent, pseudoparaphyllia filamentous, subfilamentous, narrowly or broadly foliose to deltoid, rarely ciliate. Leaves commonly in two curving rows, the plants more or less complanate, at times evenly foliate, more or less terete. Stem leaves often larger, wider, and with better alar cell development than branch leaves. Leaves concave, falcate-secund to circinate, ovate-lanceolate, oblong-lanceolate or elongate-triangular, not or variously decurrent, smooth or plicate, apex acute to long and slenderly acuminate, margins entire, serrulate to denticulate, plane, narrowed recurved below, or revolute throughout; costa short and double or lacking; median cells linear-rhomboidal to linear-flexuose, basal cells shorter, incrassate and usually porose near insertion, alar cells thin-walled, enlarged and hyaline, or homogeneously incrassate, small, subquadrate to short-rectangular, or with a few small, subquadrate cells above enlarged hyaline cells at the extreme basal angles. Perichaetial leaves lanceolate or oblong-ovate, long to filiform acuminate, smooth or plicate, serrate, serrulate, or entire. Dioicous, phyllodioicous, or autoicous. Setae elongate, smooth, yellowish-red, red, reddish-brown, to brown. Capsules suberect, inclined, horizontal, or pendent, curved and asymmetric, ovoid, to long-cylindrical, smooth or plicate when dry, stomata present; operculum conic-obtuse to rostrate; annulus of 2--3 rows of cells, falling with operculum. Peristome double, mostly perfect, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane high, segments keeled, perforate, cilia well-developed, nodose or appendiculate, 1-3, or rudimentary. Spores spherical, nearly smooth to lightly roughened, 8--30 mm. Calyptra cucullate, naked.

### Key to the species of **Hypnum** in Maine.

Key to the species of **Hypnum** in Maine.

1. Stem epidermal cells enlarged, thin-walled and hyaline ............. 2
1. Stem epidermal cells not noticeably enlarged, thin-walled or
 hyaline ........................................................6

2. Plants growing in wet or swampy places, with few branches, never pinnate; leaves acute to broadly acuminate; alar cells conspicuously enlarged or inflated ...............3
2. Plants growing in mesic to dry places, usually regularly pinnate; leaves filiform-acuminate; alar cells irregularly subquadrate or with a few oblong, inflated and hyaline cells at basal angles bordered above by small, subquadrate cells ................................4

3. Leaves auriculate; alar cells gradually enlarged; pseudoparaphyllia lanceolate; capsules smooth; endostomal cilia nodose .........................................................**H. pratense**
3. Leaves not auriculate; alar cells abruptly inflated in 2-3 rows; pseudoparaphyllia broadly foliose; capsules strongly furrowed; endostomal cilia appendiculate .....................**H. lindbergii**

4. Stem leaves auriculate or rounded to the insertion .......... ..............................................**H. plicatulum**
4. Stem leaves rounded or straight to the insertion .........5

5. Alar cells scarcely differentiated or consisting of a few, small, subquadrate cells with 1-2 larger, hyaline cells at the extreme angles; dioicous .....................................**H. hamulosum**
5. Alar cells consisting of an excavate basal group of enlarged, thin-walled, hyaline cells bordered above by a few small, irregularly subquadrate cells; autoicous ...........................**H. fertile**

6. Alar cells consisting of a few hyaline, thin-walled, inflated cells forming short decurrencies and bordered above by a few short-oblong to subquadrate cells ............7
6. Alar cells thick-walled throughout ..........................8

7. Stem leaves auriculate at base, broadly acuminate to acute; dioicous .......................................................**H. curvifolium**
7. Stem leaves straight or rounded to the insertion, long, slenderly acuminate; autoicous .................................. **H. fertile**

8. Plants medium to large; pseudoparaphyllia foliose, branched or ciliate; alar cells hyaline to orange below, smaller and opaque above, quadrate to subquadrate ........... ........................................... **H. imponens**
8. Plants small to medium-sized; pseudoparaphyllia filamentous to narrowly foliose, entire; alar cells opaque, transversely elongate or equal sized throughout ............................................9

9. Autoicous; leaf margins serrulate to serrate throughout .**H. pallescens**
9. Dioicous; leaf margins entire or serrulate toward the apex .......... 10

10. Capsules present ............................................. 11
10. Capsules absent .............................................. 13

11. Capsules erect to suberect, symmetric; operculum mammillate ................................................ **H. mammillatum**
11. Capsules arcuate, asymmetric, operculum rostrate .................12

12. Plants small; leaves straight to weakly falcate .............. ........................**H. cupressiforme var. filiforme**
12. Plants small, medium or robust; leaves (other than those on filiform branches) falcate-secund........................ ...................**H. cupressiforme var. cupressiforme**

13. Plants small; leaves straight to weakly falcate ........................ ..................................**H. cupressiforme var. filiforme**
13. Plants small, medium, or robust; leaves (other than those on filiform branches) falcate-secund ........................................14

14. Plants small; leaves sharply serrulate above; alar cells heterogeneous with some larger, hyaline cells at the basal angle ..........................**H. mammillatum**
14. Plants small, medium, or robust; leaves subentire to moderately serrulate above; alar cells homogeneous ..................**H. cupressiforme var. cupressiforme**

1. *Hypnum curvifolium* Hedw., Sp. Musc. Frond. 285. 1801.

Plants medium to robust, shiny yellow-green in dense mats. Stems prostrate, creeping, orange-brown to red, pinnately branched; in cross-section hylodermis absent, central strand present. Pseudoparaphyllia narrowly to broadly foliose. Leaves in two curving rows, more or less complanate. Stem leaves 1.5--2.0 mm long, falcate-secund, triangular-ovate, concave, not decurrent, smooth, apex short and broadly acuminate to acute, rounded to auriculate at base, margins serrulate above, plane to erect; costa short and double; median cells linear-flexuose, 45--65 mm x 6 mm, firm-walled, basal cells shorter and broader, alar cells with 1--2 rows of thin-walled, enlarged, hyaline cells below a small cluster of small, quadrate cells. Branch leaves smaller, narrower, with weakly differentiated alar cells. Dioicous. Inner perichaetial leaves lanceolate, abruptly acuminate, 4 mm long, strongly plicate, weakly serrulate. Setae reddish-brown, 25--35 mm long. Capsules asymmetric, curved, mouth more or less vertical, 2.5--3.0 mm long, obovoid-cylindric, plicate dry; operculum conic-apiculate; annulus poorly differentiated. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane medium in height, segments keeled, narrowly perforate, cilia 2-3, nodose, rarely appendiculate. Spores spherical lightly roughened, 14--20 mm. Calyptra not seen.

A forest species found on soil banks and humus over rocks and logs, occasionally on bark at the base of trees. In Maine known from Hancock (*Merrill 85* MAINE, MO), Knox (*Allen 14620* MO), Oxford (*Stevens 1567* MAINE, NY), and Waldo (*Allen 10386* MO) counties.

*Hypnum curvifolium,* an eastern North American endemic, is a large sized *Hypnum* with smooth, falcate-secund leaves that are neatly arranged on two sides of the stems and branches. The plants have the braided aspect and size of *H. imponens*, but that species is more regularly pinnately branched, has an extensive area of large, firm-walled, reddish-orange alar cells, and deeply incised pseudoparaphyllia. Microscopically *H. curvifolium* has leaves with short, broad apices, broadly rounded to auriculate bases and heterogeneous alar cells. The

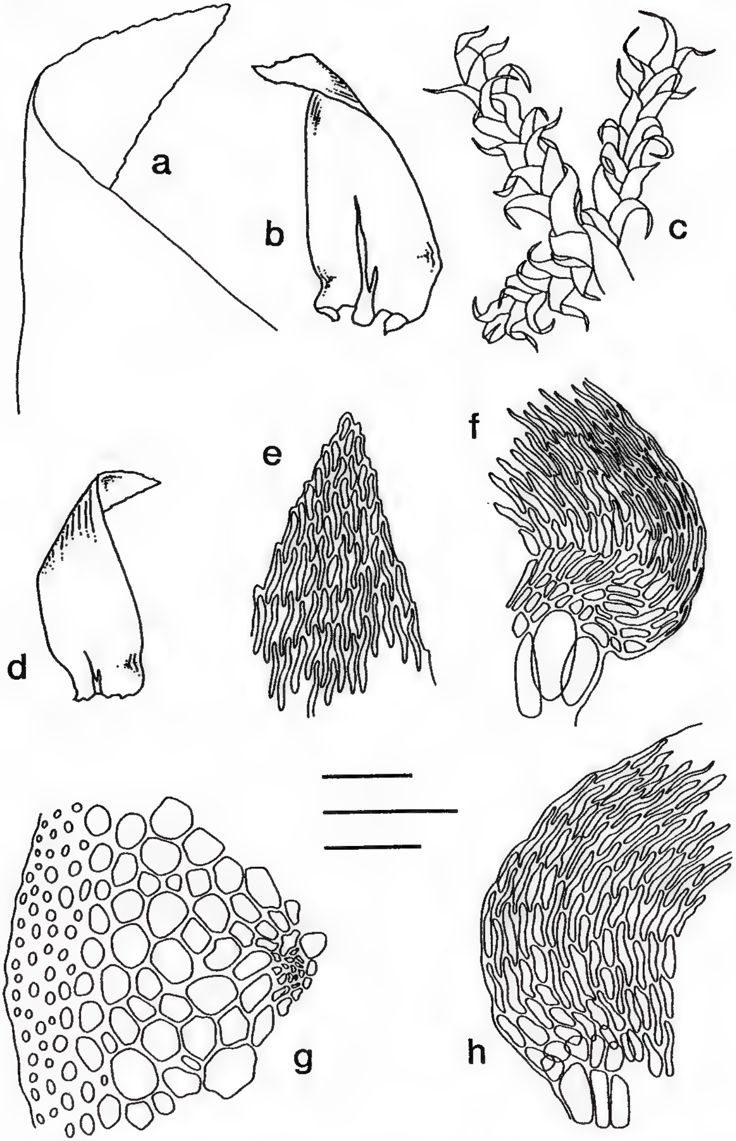

Figure 1. ***Hypnum curvifolium***. a. Leaf apex. b. & d. Stem leaves. c. Habit. e. Leaf apex. f. & h. Leaf bases. g. Stem cross-section. Scales in mm: Top = 0.05 (e–g); top = 0.1 (a); middle = 0.5 (b, d.); bottom = 1.0 (c).

alar region has 1-2 rows of enlarged, thin-walled, hyaline cells below a cluster of small, irregularly subquadrate, thick-walled cells.

The capsules of *H. curvifolium* are strongly plicate as are its perichaetial leaves, and these in conjunction with its type of alar cell development seem to indicate a relationship with *H. lindbergii* (Crum & Anderson 1981). Both Fleischer (1914) and Herzog (1926) placed the two species in the segregate genus *Breidleria*. Ando (1973), however, treated *Breidleria* at the sectional level (as section *Pratensia* B.S.G.) and, emphasizing the presence or absence of a stem hyalodermis as a sectional character, placed *H. lindbergii* and *H. curvifolium* in different sections.

2. *Hypnum cupressiforme* Hedw., Sp. Musc. Frond. 291. 1801.

> *Stereodon cupressiformis* (Hedw.) Brid. *ex* Mitt., J. Linn. Soc., Bot. Suppl. 1: 96. 1859. *Drepanium cupressiforme* (Hedw.) Roth., Eur. Laubm. 2: 621. 1904.

Plants small, medium, large or robust, yellowish-green or dark green in dense, at times pendent mats. Stems prostrate, creeping, yellowish-green to orange-brown or red, densely but irregularly branched; in cross-section hylodermis absent, central strand rudimentary to moderately developed. Pseudoparaphyllia narrowly foliose, subfiliform or filiform. Leaves in two curving rows, more or less complanate. Axillary hairs fugacious, with 1-2 reddish, quadrate basal cells and 2--4 hyaline, oblong upper cells, occasionally the terminal cell light reddish. Stem leaves 1--2 mm long, falcate-secund or erect, ovate- to oblong-lanceolate, concave, weakly decurrent, smooth, apex narrowly acuminate, straight to rounded at base, margins weakly serrulate to subentire, recurved or erect below, plane above; costa short and double; median cells linear-rhomboidal, (35-)60--80 mm x 4 mm, firm-walled, basal cells similar, smaller, thicker-walled, pitted near insertion, alar cells small, subquadrate to quadrate, thick-walled, in 10--15 rows, opaque, often with a few larger, hyaline, rectangular cells below. Branch leaves smaller, narrower, with more weakly differentiated alar cells. Dioicous. Inner perichaetial leaves oblong-lanceolate, narrowly acuminated, smooth, serrulate. Setae reddish-brown, 12--20 mm long.

Capsules inclined, oblong-cylindric, asymmetric, 2 mm long, smooth, operculum rostrate 0.7--1 mm long; annulus 1--2 seriate. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane medium in height, segments keeled, narrowly perforate, cilia 1--2, poorly developed to rudimentary. Spores spherical, lightly roughened, 12--16 mm. Calyptra not seen.

On tree (*Acer, Ostrya, Quercus*) trunks, logs, rotting stumps, rocks, boulders, and soil in woods. In Maine known from Cumberland (*Allen 2001* MO), Hancock (*Allen 2086* MO), Knox (*Allen & Allen 6045* MO), Lincoln (*Allen 13077* MO), Sagadahoc (*Allen 14596* MO), Waldo (*Redfearn 3778 MO1*), Washington (*Davis 217* MAINE), and York (*Allen 13041 MO*) counties. Reported from Oxford county (Parlin 1939).

*Hypnum cupressiforme* is the most variable species of *Hypnum*. Ando (1989, 1990, 1992, 1993) in a detailed study of the species concluded it was an "exceedingly polymorphic species complex" with many subtle intermediate and puzzling forms. He divided the species into 9 varieties and 12 forms, and as a result the species is very difficult to characterize. It has a well-developed, opaque alar region consisting of many subquadrate to rectangular cells. Its pseudoparaphyllia, around single buds, vary from narrowly foliose to subfilamentous to filamentous, the perichaetial leaves are smooth and the capsules are generally inclined and have rostrate opercula. In nearly all of its other features the species exhibits apparently unlimited variation (Ando 1989). In Maine three forms and one variety are commonly encountered. In the typical form the plants are usually found on rocks and boulders in the woods. They are medium to large sized, the leaves are complanate and falcate-secund, the leaf margins weakly serrulate and the alar cells more or less homogeneous. A second form corresponds to this typical form in most ways except the plants are more or less terete with generally erect leaves. A third distinct form of the species is commonly found on tree trunks. It has slender, often pendent plants with complanate, falcate-secund leaves, more strongly serrate leaf margins, and a more heterogeneous alar region, with occasionally a few enlarged, hyaline cells at the leaf insertion. This slender, pendent form often has terete, filiform branches with erect leaves and can be difficult to distinguish

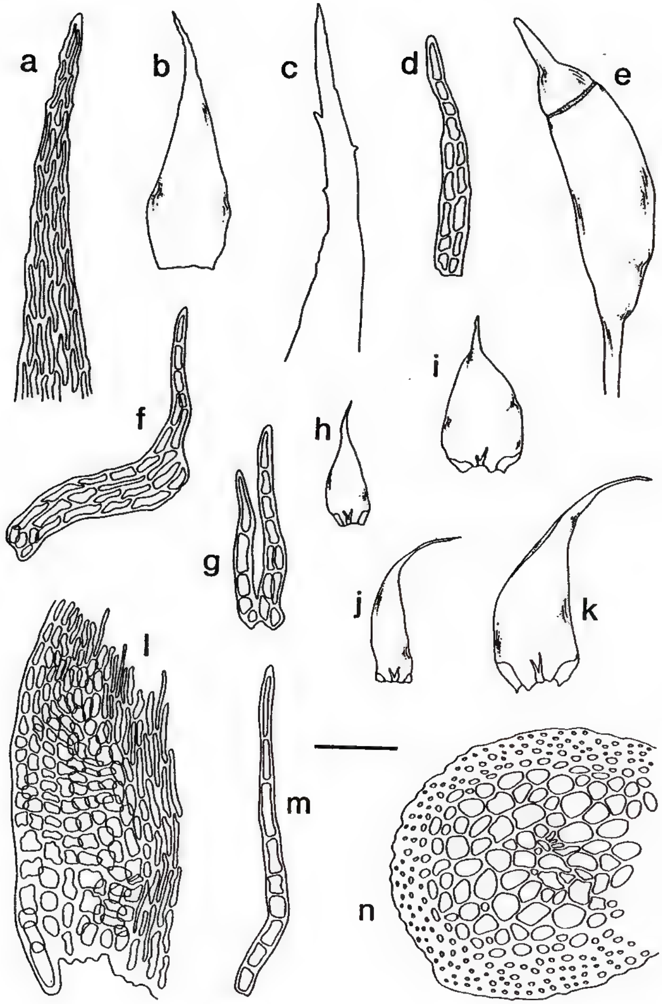

Figure 2. *Hypnum cupressiforme*. a. Leaf apex. b. Perichaetial leaf. c. Perichaetial leaf apex. d. Pseudoparaphyllium. e. Capsule and operculum. f. & g. Pseudoparaphyllia. h. Leaf, var. *filiforme*. i. Leaf, terete-form. j. Leaf, pendulous-form. k. Leaf, typical expression. l. Leaf base. m. Pseudoparaphyllium. n. Stem cross-section. Scale in mm: = 0.05 (a, d, f, g, l-- n); = 0.1 (c); = 0.5 (b, e, h--k).

from the variety *filiforme* which is a slender plants, with erect leaves that usually is found on rocks and boulders.

*Hypnum cupressiforme* can be extremely difficult to distinguish from *H. mammillatum.* The two species are best distinguished by sporophytic characters. *Hypnum mammillatum* has erect to inclined, symmetric capsules with conic-mammillate opercula, while in *H. cupressiforme* the capsules are arcuate, asymmetric, and have conic-rostrate opercula. Unfortunately, both species are dioicous and while sporophytes of *H. cupressiforme* are extremely rare, those of *H. mammillatum* are unknown in North America. Gametophytically, *H. mammillatum* is a small species with distinctly falcate-secund leaves that are often sharply serrulate above, have recurved basal leaf margins, and alar cells that have 1--2 hyaline, enlarged, rectangular cells below its distinctive cluster of small, subquadrate, thick-walled alar cells. *Hypnum cupressiforme* grades into this species in all ways and as a result the separation of the two species remains problematical. Some forms of *H. cupressiforme* can be confused with *H. imponens* or *H. pallescens*, both of which can have somewhat similar alar cells. *Hypnum imponens* differs from *H. cupressiforme* in its more regularly pinnate branching and in its broadly foliose, ciliate pseudoparaphyllia, while *H. pallescens* is an autoicous species with sharply serrulate leaf margins and short leaf cells.

2a. *Hypnum cupressiforme* Hedw. var. *filiforme* Brid., Muscol. Recent. 2(2): 138. 1801.

> *Stereodon cupressiforme* (Hedw.) Brid. *ex* Mitt. ssp. *filiforme* (Brid.) Lindb., Musci Scand. 38. 1879. *Stereodon cupressiforme*. var. *filiforme* (Brid.) Braithw., Brit. Moss Fl. 3: 162. 1902. *Hypnum filiforme* (Brid.) Loeske, Moosfl. Harz. 318. 1903. *Drepanium cupressiforme* (Hedw.) Roth. var. *filiforme* (Brid.) Roth, Eur. Laubm. 2: 623. 1904. *Hypnum cupressiforme* Hedw. fo. *filiforme* Krahmer, Mitth. Thüring. Bot. Vereins 40: 37. 1931. *Hypnum cupressiforme* Hedw. ssp. *filiforme* (Brid.) Bertsch., Moosfl. 134. 1949.

Plants slender, yellowish-green or dark green in loose or dense mats. Stems prostrate, creeping, yellowish-green to orange-brown or red, sparsely and irregularly branched; in cross-section hylodermis absent, central strand rudimentary. Pseudoparaphyllia narrowly foliose, subfiliform or filiform. Leaves erect spreading. Axillary hairs fugacious, with 1-2 reddish, quadrate basal cells and 2--4 hyaline, oblong upper cells. Stem leaves 1--1.5 mm long, straight to very weakly falcate, ovate- to oblong-lanceolate, concave, weakly decurrent, smooth, apex narrowly acuminate, straight to rounded at base, margins weakly serrulate to subentire, plane or recurved at base; costa short and double; median cells linear-rhomboidal, 45--60 mm x 6 mm, firm-walled, basal cells similar, smaller, thicker-walled, pitted near insertion, alar cells small, subquadrate to quadrate, thick-walled, in 10--15 rows, opaque, often with a few larger, hyaline, rectangular cells below. Branch leaves smaller, narrower, with more weakly differentiated alar cells. Dioicous. Sporophytes unknown in Maine.

On boulders and vertical rock faces in woods, rarely on tree trunks (*Fagus*). In Maine known from Cumberland (*Allen 6001* MO), Hancock (*Redfearn 37730* MO), Lincoln (*Allen 9213* MO), Sagadahoc (*Norton* MAINE), and Waldo (*Allen 10366*) counties.

*Hypnum cupressiforme* var. *filiforme* is a slender expression of *H. cupressiforme* that differs only in having straight to weakly falcate leaves and relatively fewer alar cells. In Maine the species is most commonly found on boulders and vertical rock faces. It can be very difficult to distinguish from slender, pendulous forms of *H. cupressiforme* var. *cupressiforme* which often have filiform branches with erect rather than falcate-secund leaves. Ando (1992) recognizes 6 forms of the var. *filiforme* and also considers it very close to, perhaps only an ecological variant of, the pendulous forms of var. *cupressiforme*. In North America this variety has been confused with *H. cupressiforme* var. *resupinatum* (Tayl.) Schimp. *in* Spruce. Apparently, Crum & Anderson's (1981) treatment and figures of *H. cupressiforme* var. *filiforme* actually represent the pendulous forms of var. *cupressiforme*, while their treatment and figures of *H. cupressiforme* var. *resupinatum* represent the type concept of var. *filiforme*. Likewise, Redfearn's (1983) treatment of *H. cupressiforme* var. *resupinatum* also represents the type concept of *H. cupressiforme* var. *filiforme*.

3. *Hypnum fertile* Sendtn., Denkschr. Bayer Bot. Ges. Regensburg 3: 147. 1841.

Plants small, pale, yellowish-green in dense mats. Stems prostrate, creeping, regularly pinnate; in cross-section with a moderately developed hylodermis, central strand present. Pseudoparaphyllia narrowly foliose to deltoid. Leaves in two curving rows, more or less complanate. Stem leaves 1.5--2 mm long, falcate-secund, oblong-triangular to ovate-lanceolate, concave, straight or rounded at base, decurrent, smooth, apex long and slenderly acuminate, margins weakly serrulate above, plane to erect below; costa short and double; median cells linear-flexuose, 50--70 mm x 4 mm, firm-walled, basal cells 30--35 mm x 4 mm, incrassate and usually porose near insertion, alar cells enlarged and hyaline at basal angle, with several smaller, irregularly subquadrate or shortly rectangular cells above. Branch leaves smaller, narrower, with weakly differentiated alar cells. Autoicous. Inner perichaetial leaves long lanceolate, long acuminate, 3.0 mm long, plicate below, serrulate above. Setae reddish-brown, 20--30 mm long. Capsules curved to arcuate, 2--2.5 mm long, cylindrical, smooth to lightly plicate at base when dry; operculum conic-apiculate. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish, lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia 2--3, well developed, nodose or appendiculate. Spores spherical, lightly roughened, 10--14 mm. Calyptra not seen.

On rotting logs. Reported from Oxford (Parlin 1939) and Washington (Spencer 1993) counties. All other reports of the species from Maine are based on misdeterminations.

This species belongs to section *Fertilia* Ando, a section of small, medium or large sized, autoicous plants, with a poorly developed stem hyalodermis, plicate perichaetial leaves and stem leaves having an alar region consisting of heterogeneous cells. Both Ando (1973) and Schofield (1992) considered the stems of *H. fertile* to be not strictly hyalodermis, and this is true to some extent. The epidermal cells in *H. fertile* are never as fully enlarged as can be found, for example, in *H. lindbergii* Mitt.; they are however consistently enlarged and relatively

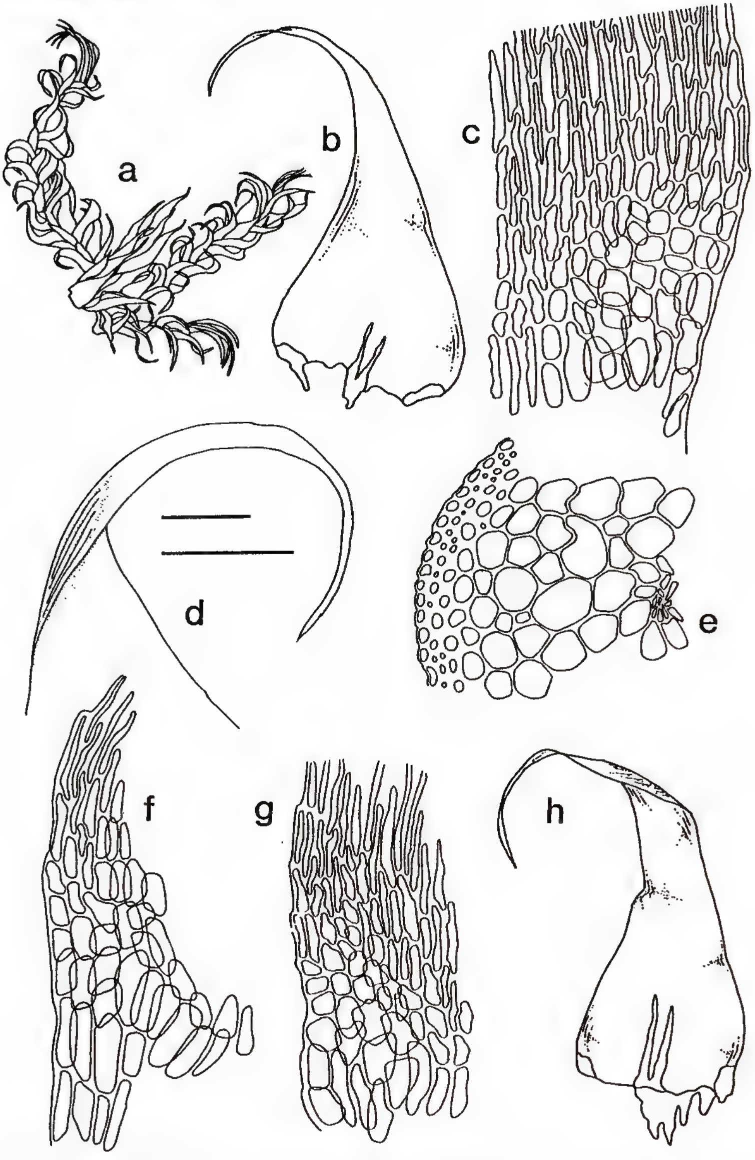

Figure 3. *Hypnum fertile*. a. Habit. b. & h. Stem leaves. c., f. & g. Leaf bases. d. Leaf apex. e. Stem cross-section. Scales in mm:Top = 0.05 (c, e, f, g); top = 0.1 (d); top = 1.0 (a); bottom = 0.5 (b, h).

thin-walled when compared to species of the "non-hylodermis"-sections of *Hypnum*. On the other hand, some species in the "hylodermis"-sections (i.e., *Pratensia* and *Hamulosa* B.S.G.) don't always exhibit a fully developed hylodermis. In fact the feature seems to be variably expressed within some species.

*Hypnum fertile* is a small to medium sized species with a field-aspect often identical to *Hypnum plicatulum*. There have been a large number of *Hypnum* collections from Maine named *H. fertile*, however, these have all turned out to be misdeterminations of *H. plicatulum*, *H. pallescens*, or *H. imponens*. *Hypnum pallescens* is similar to *H. fertile* in size and in its autoicous sexual condition, but it differs in having sharply serrate upper leaf margins, relatively short leaf cells, a more extensive development of quadrate cells in its alar region, and rostrate opercula. *Hypnum imponens* is larger than *H. fertile*, has an extensive area of enlarged, bulging though firm-walled, usually orange-red alar cells and broadly foliose to ovate, distinctly ciliate pseudoparaphyllia.

Most Maine collections named *H. fertile* have turned out to be *H. plicatulum*, a more northerly distributed species previously overlooked (see Allen 1996) in the state. Although placed in different sections (Ando 1973), *H. fertile* can be very difficult to distinguish from *H. plicatulum*. The surest way to separate the two species is based on sexuality. Plants of *H. fertile* are autoicous with perigonia occurring very near the perichaetia on the same stem. *Hypnum plicatulum* is phyllodioicous. When dealing with non-fertile material separation of the species depends upon a careful examination of the basal, marginal area of the stem leaves. In *H. plicatulum* the stem leaves are auriculate or rounded at base. In contrast the stem leaves of *H. fertile* can be rounded or straight to the insertion, with both types of leaves occurring on single stems. The alar cells of *H. plicatulum* generally consist of a few small, thick-walled subquadrate to rectangular cells that are positioned away from the leaf margin due to the leaf base auriculation. When the leaves are simply rounded to the insertion the alar cells are not displaced, and occur along the basal margin. Often there are a few enlarged, inflated cells at the very base of the leaf, these cells however appear to be stem hyalodermal cells rather than alar cells. In contrast the alar cells of *H. fertile* consist of an excavate group of enlarged, thin-walled, hyaline cells at the base of the leaf above which are a few small, irregularly subquadrate cells along the basal margin.

4. *Hypnum hamulosum* Schimp. *in* B.S.G., Bryol. Eur. 6: 96. 1854.

> *Stereodon hamulosum* (Schimp. *in* B.S.G.) Lindb., Acta Soc. Sci. Fenn. 10: 255. 1872.
>
> *Hypnum cupressiforme* var. *hamulosum* Brid., Musc. Recent. Suppl. 2: 217. 1812.

Plants small, shiny, in yellowish-green mats. Stems prostrate, creeping, regularly pinnate; in cross-section with a well-developed hylodermis, central strand present. Pseudoparaphyllia narrowly foliose to deltoid. Leaves in two curving rows, more or less complanate. Stem leaves 1.3--2 mm long, circinate-secund, lanceolate to ovate-lanceolate, concave, straight or slightly rounded at base, not decurrent, plicate at base, apex long and slenderly acuminate, margins serrulate above, plane to somewhat narrowly recurved below; costa short and double; median cells linear-flexuose, 60--70 mm x 4 mm, firm-walled, basal cells shorter, incrassate and usually porose, alar cells poorly differentiated, a few short, subquadrate cells with 1-2 somewhat enlarged and hyaline cells at the basal angles. Branch leaves smaller and narrower. Phyllodioicous (vide Ando 1972a). Sporophytes unknown from Maine.

On old wood. In Maine known from Oxford (*Howard* MAINE) county.

*Hypnum hamulosum* is a boreal species related to those *Hypnum* groups characterized by the presence of a stem hyalodermis. It is a small, regularly pinnately branched species with narrow, circinate-secund leaves that are straight to weakly rounded at base and have only a few, subquadrate alar cells. It is one of three species (*H. plicatulum*, *H. hamulosum* and *H. callichroum* Brid.) of section *Hamulosa* in eastern North America. *Hypnum plicatulum* differs from *H. hamulosum* in its auriculate to strongly rounded stem leaves and better developed alar cells, while *H. callichroum* differs in having numerous, thin-walled and enlarged alar cells. *Hypnum lindbergii* and *H. pratense*, members of the other hylodermis section of *Hypnum* differ in their larger size,

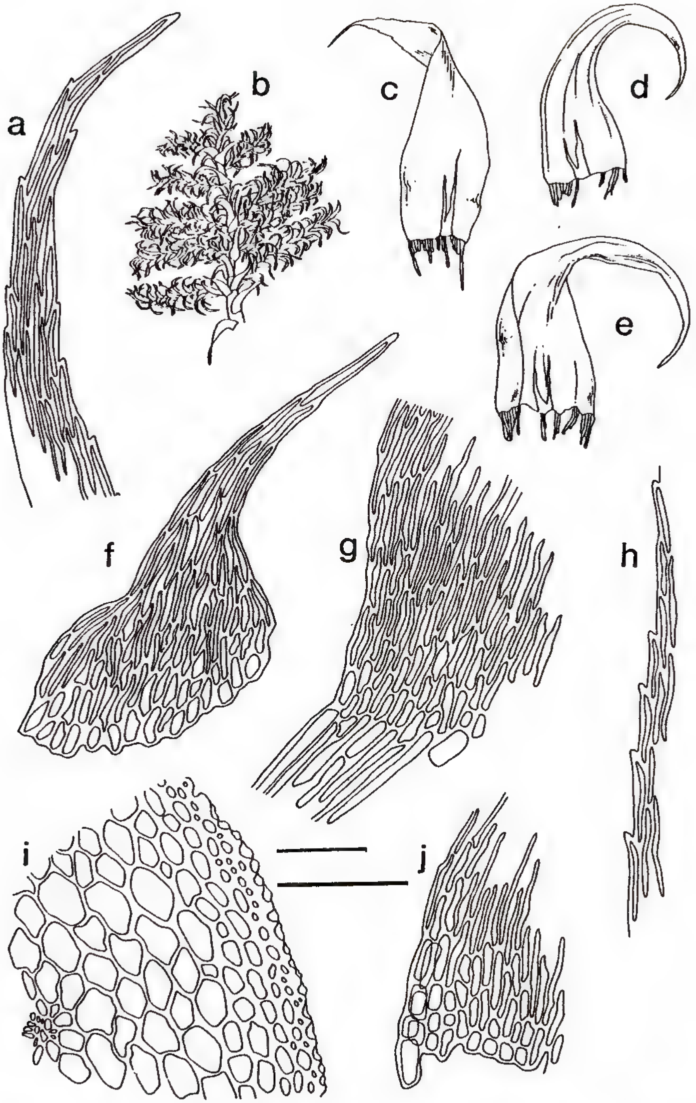

Figure 4. ***Hypnum hamulosum***. a. Leaf apex. b. Habit. c.–e. Stem leaves. f. Pseudoparaphyllium. g. & j. Leaf bases. h. Median leaf margin. i. Stem cross-section. Scales in mm:Top = 0.05 (a, f–j); top = 0.5 (c–d); bottom = 5 (b).

irregularly branched habit, and broadly acute leaf apices. *Hypnum fertile* resembles *H. hamulosum* in size, leaf apex shape, and its regularly pinnately branched habit. It differs from *H. hamulosum* in its more weakly developed stem hylodermis, its alar cells that consist of an excavate group of enlarged, thin-walled, hyaline cells at the base of the leaf above which are a few small, irregularly subquadrate cells along the basal margin, and its autoicous sexual condition with perigonia occurring very near the perichaetia on the same stem.

Grout (1940) reported *H. hamulosum* from Maine with only the comment "*H. hamulosum* in South Hartford, Maine, by Mrs. C. D. Adams." A year earlier Parlin (1939) had reported *H. callichroum* from Maine with the comment "Howard Hill, S. Hartford, 1938 (V. A. H.). "First collection in N. E. United States." A. J. Grout." These two reports were apparently based on the same collection as judged from notes inside the packet on a label of *H. callichroum* "see revised label, *Hypnum hamulosum* as finally determined by A. J. Grout." The nearest stations for this boreal species are northern Quebec to Labrador (Ando 1972) and the Lake Superior region of Ontario (Crum & Anderson 1981) The full label data for this collection are: On old wood in Leach Woods of Howard Hill near Northeast Pond, S. Hartford, Oxford County, 6 Nov. 1938, *V. A. Howard* [*Parlin 13878*].

5. *Hypnum imponens* Hedw., Sp. Musc. Frond. 290. 1801.

> *Hypnum cupressiforme* ssp. *imponens* (Hedw.) Boul., Muscin. France 1: 34. 1884. *Hypnum cupressiforme* var. *imponens* (Hedw.) Mach., Cat. Discr. Briol. Portug. 117. 1919. *Stereodon imponens* (Hedw.) Brid., J. Linn. Soc., Bot. Suppl. 1: 96. 1859.

Plants medium to robust, yellow-green, golden, yellowish-brown, reddish-yellow in dense mats. Stems prostrate, creeping, at times weakly ascending, regularly pinnate; in cross-section hylodermis absent, central strand present. Pseudoparaphyllia broadly foliose, to ovate, ciliate-incised. Leaves in two curving rows, more or less complanate. Stem leaves 2--2.5 mm long, falcate-secund, oblong-triangular to oblong-lanceolate, concave, decurrent, smooth, apex long and slenderly acuminate, margins serrulate above, plane to somewhat narrowly recurved below; costa short and double; median cells linear-flexuose,

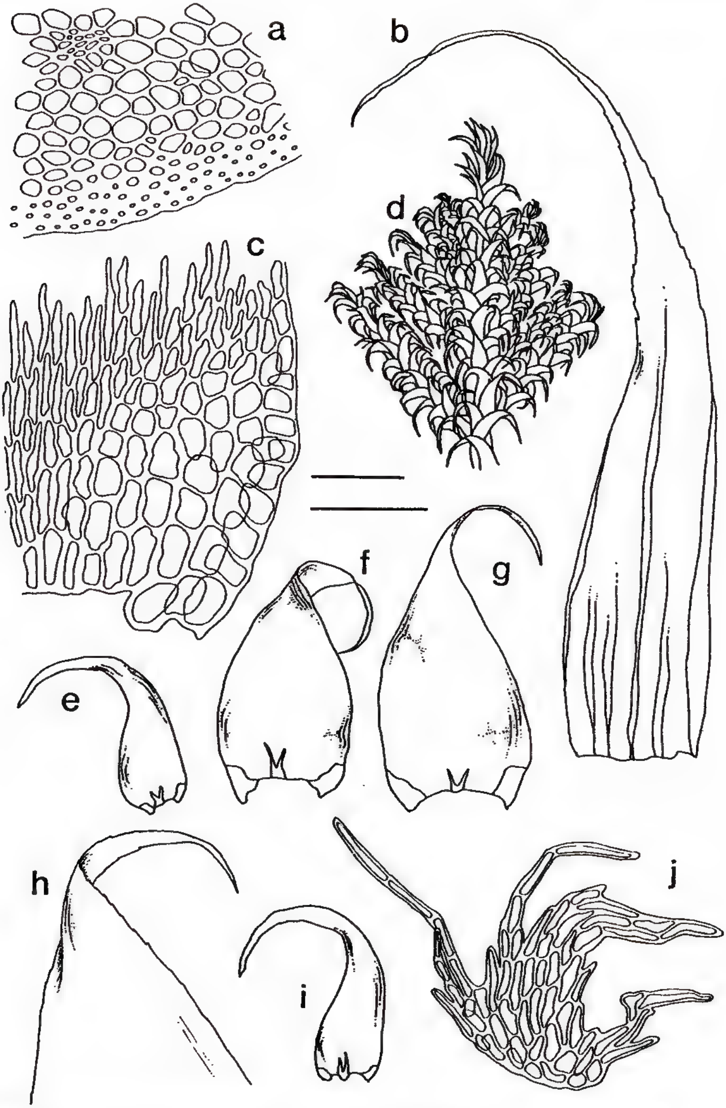

Figure 5. *Hypnum imponens*. a. Stem cross-section. b. Perichaetial leaf. c. Leaf base. d. Habit. e. & i. Branch leaves. f & g. Stem leaves. h. Leaf apex. j. Pseudoparaphyllium. Scales in mm: Top = 0.05 (a, c, j); top = 0.2 (h); top = 0.5 (b, e–g, i); bottom = 3 (d).

50--70 mm x 3-5 mm, firm-walled, basal cells near insertion shorter, incrassate and usually porose, alar cells short-rectangular to quadrate, incrassate above, enlarged and quadrate to rectangular below, hyaline or orange-brown. Branch leaves smaller, narrower with weakly differentiated alar cells. Dioicous. Inner perichaetial leaves lanceolate, long-acuminate, 3.5 mm long, plicate at base, sharply serrate above. Setae reddish-brown, 10--27 mm long. Capsules suberect, 2--3 mm long, cylindrical, smooth or weakly wrinkled when dry; operculum conic-rostellate; annulus poorly differentiated. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia rudimentary, 1-2. Spores spherical lightly roughened, 12--16 mm. Calyptra not seen.

On ground in bogs, on soil or humus in forest or over boulders and ledges, decaying or rotting logs, and tree trunks (*Betula*, *Picea*). In Maine known from Androscoggin (*Allen 14703* MO), Aroostook (*Pursell 11361* MO), Cumberland (*Allen 15917* MO), Hancock (*Magill 11787* MO), Knox (*Allen 14647* MO), Lincoln (*Allen 254* MO), Oxford (*Parlin* 15991 MAINE), Penobscot (*Allen 16504* MO), Piscataquis (*Merello 25B* MO), Sagadahoc (*Allen 14604* MO), Somerset (*Allen 9390* MO), Waldo (*Allen 10333* MO), Washington (*McCleary* MO), and York (*Allen 13051* MO) counties. Reported from Franklin (Parlin 1939) and Kennebec (Pitman 1928, 1929) counties.

*Hypnum imponens* is one the most abundant forest mosses in Maine. It is a large, attractive species with shiny, yellow-green, falcate-secund leaves, regularly pinnate branches, and suberect capsules found in extensive mats over rocks, boulders, rotting wood and tree trunks. In the field it can be confused with the typical expression of *H. cupressiforme*, but that species lacks the shiny appearance of *H. imponens* and has broader, less falcate-secund leaves. Microscopically the stem leaves of *H. imponens* have an extensive area of enlarged, bulging though firm-walled, usually orange-red alar cells, but the most distinctive feature of the species is its pseudoparaphyllia. These structures are broadly foliose to ovate and have long-ciliate margins. It is the only Maine species of *Hypnum* with ciliate pseudoparaphyllia. There are occasional irregularly branched collections of *H. imponens* that are difficult to identify. These collections must be examined for branched to ciliate pseudoparaphyllia before they can be positively placed. In addition to the pseudoparaphyllia difference, *Hypnum curvifolium* differs from *H. imponens* in having stems leaves rounded to auriculate at base, and short to broadly acuminate above, while *H. cupressiforme* has numerous small, quadrate, thick-walled, and opaque alar cells.

6. *Hypnum lindbergii* Mitt., J. Bot. 2: 123. 1864.

*Stereodon lindbergii* (Mitt.) Braithw., Brit. Moss Fl. 3: 157. 1902. *Drepanium lindbergii* (Mitt.) Roth., Eur. Laubm. 2: 628. 1904. *Calliergonella lindbergii* (Mitt.) Hedenäs, Lindbergia 16: 167. 1990. New name for *Hypnum arcuatum* Lindb., Öfvers. Förh. Kongl. Svenska Vetensk.-Akad. 18: 371. 1862, a later homonym.

*Hypnum patientiae* Lindb. *ex* Milde, Bryol. Siles. 363. 1869. *Breidleria patientiae* Wijk & Marg., Buxbaumia 1: 51. 1947.

Plants large to robust, dark or light-green, yellowish-green, rarely reddish-yellow at base in dense mats. Stems prostrate and creeping, or ascending, sparsely and irregularly branched, rhizoids in abaxial cluster at leaf base; in cross-section hylodermis present, central strand present; axillary hairs with1 hyaline, quadrate, basal cell and 2--3 reddish-brown, cylindrical upper cells. Pseudoparaphyllia broadly foliose. Leaves erect-spreading in two curving rows, or distinctly complanate. Stem leaves 1.5--2.5 mm long, falcate-secund, oblong-triangular to oblong-lanceolate, concave, weakly decurrent, smooth, apex short and acute or long and slenderly acuminate, margins entire to weakly serrulate above, plane or erect; costa short and double; median cells linear-flexuose, 50--100 mm x 2.5--4 mm, firm-walled, basal cells shorter, incrassate and usually porose near insertion, alar cells enlarged and inflated in 2--3 rows of thin-walled, hyaline cells with 6--8 small, irregularly short-rectangular to quadrate cells above. Branch leaves smaller, narrower, with weakly differentiated alar cells. Dioicous. Inner perichaetial leaves long lanceolate, shortly and narrowly acuminate, plicate, lightly serrulate above. Setae reddish-brown, (15-)30--55 mm long. Capsules curved and asymmetric, 1.5--3 mm long, furrowed wet or

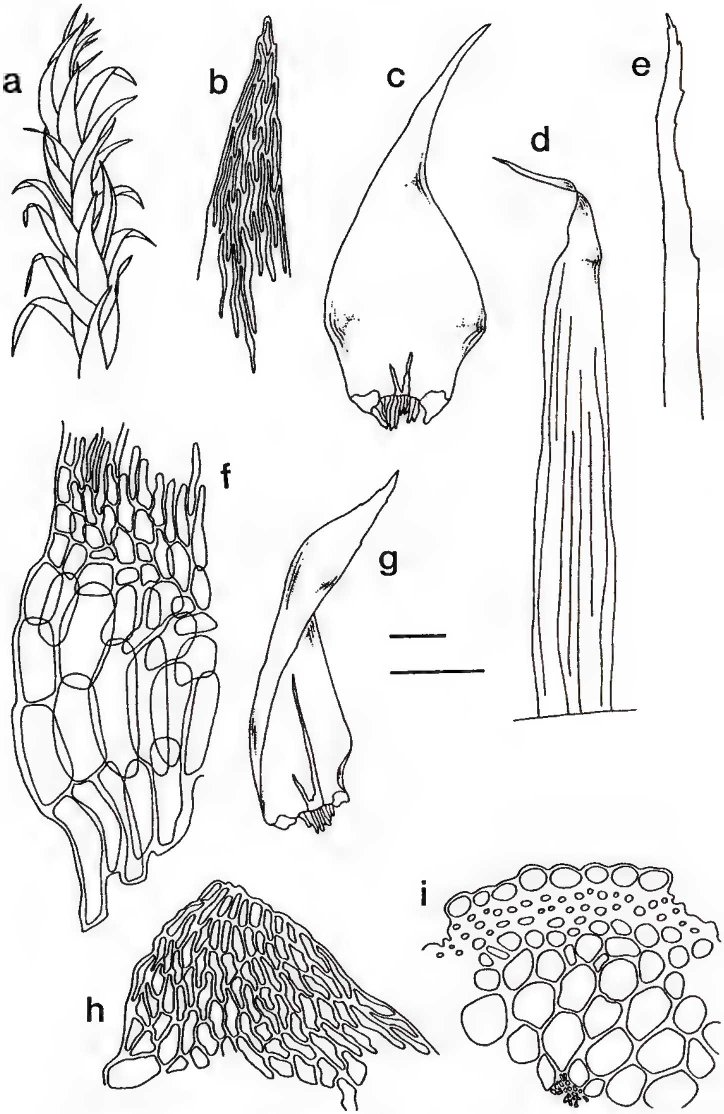

Figure 6. *Hypnum lindbergii*. a. Habit. b. Leaf apex. c. & g. Stem leaves. d. Perichaetial leaf. e. Perichaetial leaf apex. f. Leaf base. h. Paraphyllium. i. Stem cross-section. Scales in mm: Top = 7 (a); bottom = 0.05 (b, f, h, i); bottom = 0.1 (e); bottom = 0.5 (c, d, g).

dry, operculum conic-apiculate, 1 mm long; annulus poorly differentiated. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia 2--3, appendiculate above, nodose below. Spores spherical lightly roughened, 13--20 mm. Calyptra cucullate, smooth, 6 mm long.

On humus, bare soil, and sand at base of rocks (often wet and shaded), rotting logs or planks, on rocks and logs in bogs and streams or along stream banks, at times submerged or in seasonally inundated habitats, amongst grasses in or at edge of woods and on bark of trees. In Maine known from Androscoggin (*Allen 14662* MO), Aroostook (*Pursell 11383* MO), Cumberland (*Lowe* MAINE), Franklin (*Allen 10303* MO); Hancock (*Rand 381* NY), Kennebec (*Allen 14761* MO), Lincoln (*Allen 13070* MO), Oxford (*Allen 16754* MO), Penobscot (*Allen 16505* MO), Sagadahoc (*Allen 10199* MO), Somerset (*Allen 9359* MO), Waldo (*Parlin 7937* MAINE), and Washington (*Allen 16272* MO) counties.

*Hypnum lindbergii* is large species commonly found in wet or swampy habitats. It is sometimes found submerged and often occurs on bare soil along trails in moist, shady situations. The species is sparsely, irregularly branched and exhibits a multitude of forms that often make it difficult to recognize in the field. The leaves can be falcate-secund with long slenderly acuminate apices or erect-spreading with short, acute apices. The plants have a well-developed stem hyalodermis and 2--3 rows of enlarged, inflated alar cells below a small cluster of short, irregularly subrectangular, thick-walled cells. However, alar cell development in this species is variable with plants from mesic habitats having only a few inflated alar cells while plants from wet habitats have large numbers of enlarged alar cells in extensive, excavate areas. Its capsules are strongly asymmetric and furrowed when dry. The combination of its large size, well developed stem hyalodermis and inflated alar cells distinguish it from all other Maine *Hypnum* species except *H. pratense*. That species differs from *H. lindbergii* in having auriculate stem leaves with only a few enlarged, hyaline alar cells at the extreme base, axillary hairs with a red basal cell and hyaline upper cells, narrowly foliose pseudoparaphyllia, smooth capsules and nodose endostomal cilia. *Hygrohypnum ochraceum* (Turn. ex Wils.) Loeske is sometimes confused with *Hypnum lindbergii* because of its stem hyalodermis and strongly inflated alar cells. In *Hygrohypnum ochraceum*, however, the costa is broad at base, often reaches to midleaf, and can be both single and double on single stems, the leaf apices are broadly rounded to subobtuse, and the alar cells lack an upper cluster of small, thick-walled subrectangular cells.

*Hypnum lindbergii* was transferred to *Calliergonella* Loeske by Hedenäs (1990). This view is not adopted here for two reasons. First, Hedenäs considered *H. lindbergii* only within the narrow context of Ochi's (1973) section *Pratensia*. When the species is considered within the broader context of the genus *Hypnum*, all of the "unusual" features he used to transfer *H. lindbergii* from *Hypnum* are found to occur in other, sometimes most other, species. Even the most distinctive feature of *H. lindbergii*, i.e., its greatly enlarged and inflated alar cells, is a variably developed feature apparently correlated with habitat wetness. In drier habitats collections of *H. lindbergii* have weakly developed alar cells that are not much different from those seen in some collections of *H. pratense* or *H. curvifolium*. Secondly, Hedenäs's study attributes generic importance to minor characters that have previously been utilized within *Hypnum* (and often within mosses in general) only at the species level. These characters are good species indicators within *Hypnum*, but their utility at even the sectional level is questionable due to an apparently great amount of homoplasy within them.

7. *Hypnum mammillatum* (Brid.) Loeske, Abh. Bot. Ver. Prov. Brand. 47: 342. 1915.

*Hypnum cupressiforme* var. *mammillatum* Brid. Musc. Rec. 2: 137. 1801. *Hypnum cupressiforme* ssp. *mammillatum* (Brid.) Nijlander & Sael., Herb. Mus. Fenn. 61. 1859. *Stereodon cupressiformis* ssp. *mammillatus* (Brid.) Lindb., Musci Scand. 38. 1879. *Stereodon cupressiformis* var. *mammillatus* (Brid.) Braithw., Brit. Moss Fl. 3: 161. 1902. *Drepanium cupressiforme* Roth var. *mammillatum* (Brid.) Roth, Eur. Laubm. 2: 623. 1904. *Stereodon mammillatus* (Brid.) Warnst., Krypt. Fl. Brandenburg 2: 958. 1906.

*Hypnum andoi* A.J. Smith, J. Bryol. 11: 606. 1981 [1982]. A superfluous new name.

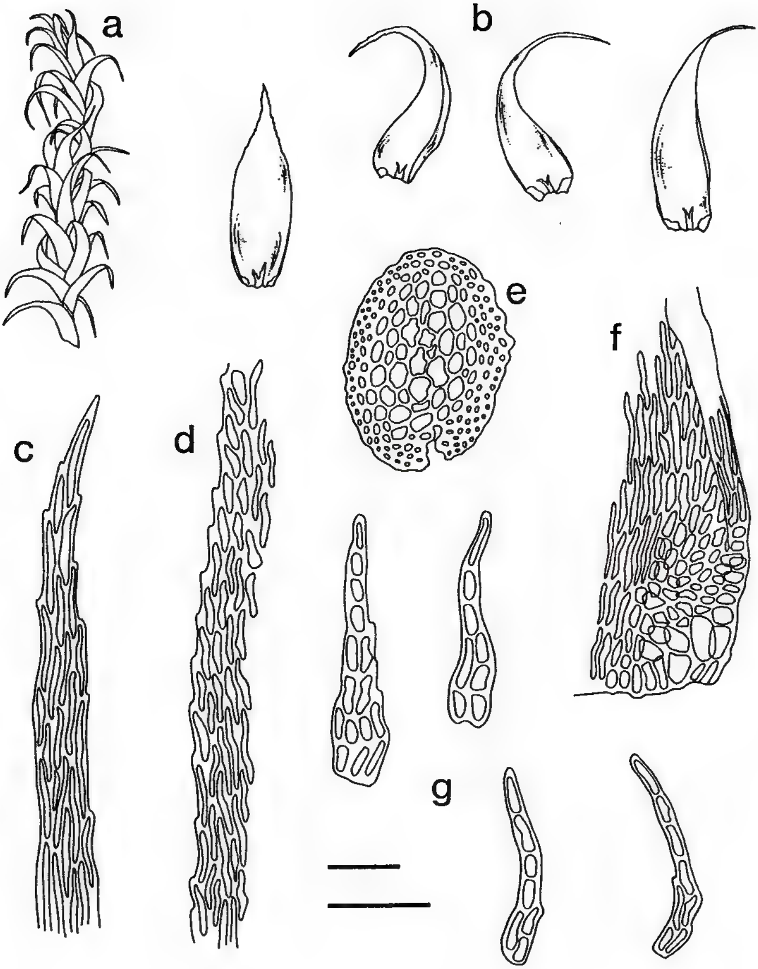

Figure 7. *Hypnum mammillosum*. a. Habit. b. Stem leaves. c. Leaf apex. d. Median leaf margin. e. Stem cross-section. f. Leaf base. g. Pseudoparaphyllia. Scales in mm: Top = 1 (a); bottom = 0.05 (c–g); bottom = 0.5 (b).

Plants small, dark green in dense mats. Stems prostrate, creeping, orange-brown to red, densely, often pinnately, branched; in cross-section hylodermis absent, central strand rudimentary. Pseudoparaphyllia narrowly foliose to subfilamentous. Leaves in two curving rows, more or less complanate. Axillary hairs fugacious, 1--2 reddish, quadrate basal cells and 1--2 hyaline, oblong upper cells. Stem leaves 0.8--1.5 mm long, falcate-secund, ovate- to oblong-lanceolate, concave, weakly decurrent, smooth, apex narrowly acuminate, straight to rounded at base, margins sharply serrulate, reflexed below, plane above; costa short and double; median cells linear-rhomboidal, 50--60 mm x 4--5 mm, firm-walled, basal cells similar, smaller, thicker-walled, pitted near insertion, alar cells small, subquadrate to quadrate, thick-walled, in 7--10 rows, often opaque, with a few larger, hyaline, rectangular cells below. Branch leaves smaller, narrower, with more weakly differentiated alar cells. Dioicous. Sporophytes not known from Maine. [Inner perichaetial leaves oblong-lanceolate, narrowly acuminated, smooth, serrulate. Seta yellowish- or reddish-brown, 10--17(-20) mm long. Capsules erect to inclined, oblong-cylindric, almost symmetric, 1.5--1.8(-2) mm long, smooth, operculum rounded-mammillate 0.7--0.8 mm long; annulus 1--2 seriate. Peristome double, exostome not or scarcely border above, cilia single or imperfectly double, fragile. Spores papillose, 17--22 mm, Ando 1987.]

On rock, granite boulders, and mica schist in woods. In Maine known from Cumberland (*Jewett* [Grout, North American Musci Pleurocarpi 385] MO), Hancock (*Allen 2077* MO), and Washington (*Collins 2570* [Crum & Anderson, Mosses of North America 379] MO) counties.

*Hypnum mammillatum* has long been associated with *H. cupressiforme* and the two species are gametophytically very close. The principal reasons for recognizing *H. mammillatum* at the species level are sporophytic. It has erect to inclined, symmetric capsules with conic-mammillate opercula, while in *H. cupressiforme* the capsules are arcuate, asymmetric, and have conic-rostrate opercula. Unfortunately, the sporophytes of *H. mammillatum* are unknown in North America. Gametophytically, *H. mammillatum* is marked by its small size, distinctly falcate-secund leaves that are often sharply serrulate above, have recurved basal leaf margins, and 1--2 hyaline, enlarged, rectangular cells below its distinctive cluster of small, subquadrate, thick-walled alar cells. This suite of characters seems to fairly well define the species, however, *H. cupressiforme* var. *cupressiforme* is a phenomenally variable species and as a result the separation of the two species remains problematical. *Hypnum cupressiforme* var. *filiforme* is similar to this species in size, however, it differs from *H. mammillatum* in having erect rather than falcate-secund leaves.

8. *Hypnum pallescens* (Hedw.) P.-Beauv., Prodr. Aethéogam. 67. 1805.
*Leskea pallescens* Hedw. Sp. Musc. Frond. 219. 1801.

*Hypnum reptile* Michx. Fl. Bor.-Amer. 2: 315. 1803.

Plants small, shiny, dark green to yellow-green in dense mats. Stems prostrate, creeping, orange-brown to red, irregularly but densely branched; in cross-section hylodermis absent, central strand present. Pseudoparaphyllia narrowly foliose to nearly filiform. Leaves in two curving rows, more or less complanate. Axillary hairs 2--4 cells, 1--2 subquadrate, red, basal cells and 1--2 oblong, hyaline, upper cells. Stem leaves 0.6--1.5 mm long, falcate-secund, oblong-ovate, concave, weakly decurrent, smooth or lightly plicate at base, broadly or narrowly acuminate, straight to rounded at base, margins serrate to serrulate throughout, reflexed below, plane above; costa strong, short and double; median cells linear-rhomboidal, 30--40 mm x 6 mm, firm-walled, basal cells near insertion smaller, thicker-walled, pitted, alar cells in 6--8 rows, small, subquadrate to quadrate, thick-walled, often opaque. Branch leaves smaller, narrower, with weakly differentiated alar cells. Autoicous. Inner perichaetial leaves lanceolate, narrowly acuminate, 3 mm long, plicate, serrulate. Setae red, 8--12 mm long. Capsules erect at base, curved above, mouth more or less vertical, 1.5--2.0 mm long, cylindric, smooth to weakly wrinkled when dry; operculum rostrate 0.5--1.0 mm long; annulus well developed, falling with operculum. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia 1--3, nodose. Spores papillose, 10--14 mm. Calyptra cucullate, yellow, smooth, naked, 1.5--2 mm long.

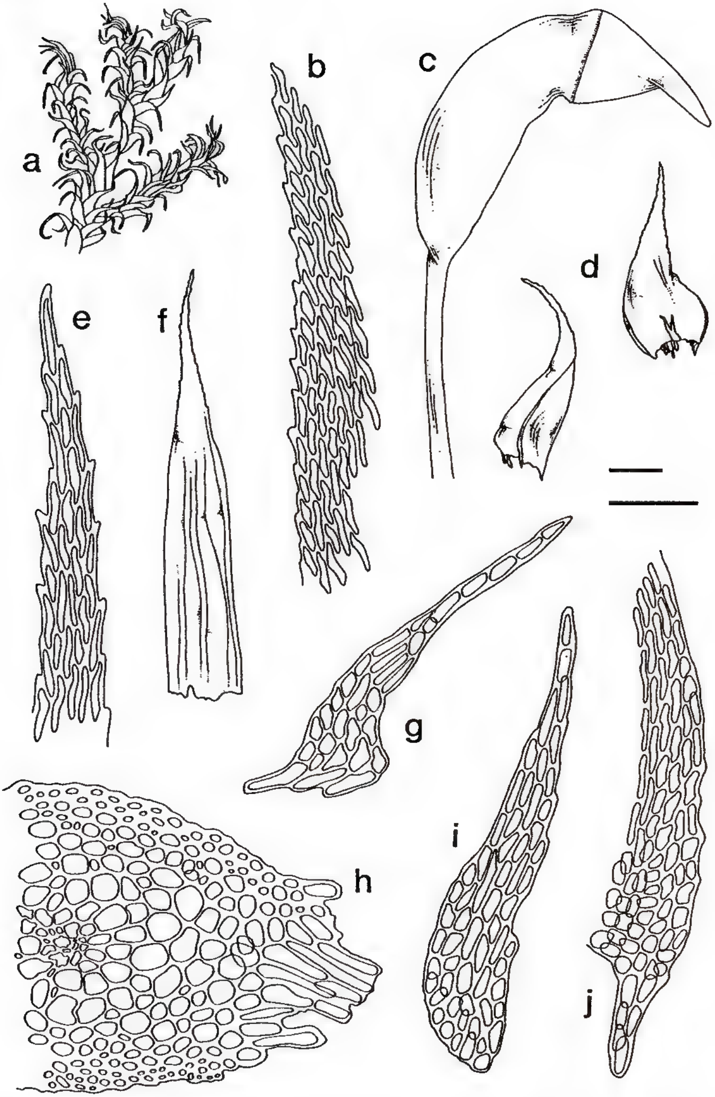

Figure 8. *Hypnum pallescens*. a. Habit. b. Leaf margin. c. Capsule and operculum. d. Stem leaves. e. Leaf apex. f. Perichaetial leaf. g. & i. Pseudoparaphyllia. h. Stem cross-section. j. Leaf base. Scales in mm: Top = 1 (a); bottom = 0.05 (b, e, g--j); bottom = 0.5 (c, d, f).

A commonly collected woodland species found on rotting wood, bark of tree trunks, twigs, and roots (*Abies, Picea, Pinus, Chamaecyparis, Fagus, Betula, Quercus, Acer, Prunus*), humus and decaying litter in woods, and thin soil over rocks and boulders. In Maine known from Aroostook (*Allen 16487* MO), Androscoggin (*Allen 14668* MO), Cumberland (*Allen 15904* MO), Franklin (*Allen 10236* MO), Hancock (*Allen 2095* MO), Kennebec (*Allen 14776* MO), Knox (*Allen 15801* MO), Lincoln (*Allen 1314* MO), Oxford (*Allen 16704* MO), Penobscot (*Allen 16500* MO), Piscataquis (*Merello 25* MO), Sagadahoc (Norton MAINE), Somerset (*Allen 9323* MO), Waldo (*Allen 10326* MO), and York (*Redfearn 31133* MO) counties. Reported from Washington county (Spencer 1993).

*Hypnum pallescens* is a small *Hypnum* species. It is autoicous and is nearly always found with sporophytes, which is probably one of the reasons it is so often collected. The capsules of *H. pallescens* are erect in the lower 2/3 but abruptly curved above so that the capsule mouth is nearly vertical. Its operculum is distinctly rostrate. Perhaps the best features for recognizing the species are found in its leaves which are sharply serrate or serrulate above, have distinctly recurved basal leaf margins, and relatively short leaf cells. The species has a broad ecological tolerance and can be found on the bark of most types of trees as well as on thin soil over rocks and boulders. It differs from most other small *Hypnum* species by its lack of a stem hyalodermis, and is most likely confused with *H. cupressiforme* which can be just as small as *H. pallescens* and has a somewhat similar alar cell development. *Hypnum cupressiforme* differs from *H. pallescens* in its dioicous sexual condition, its entire to weakly serrulate leaves and longer leaf cells. There is a possibility of confusion between *H. pallescens* and *Homomallium adnatum* (Hedw.) Broth., *Platygyrium repens* (Brid.) Schimp. *in* B.S.G., and *Pylaisiadelpha tenuirostris* (Bruch & Schimp *ex* Sull.) Buck which are all more or less the same size. In *Homomallium adnatum* the leaf margins are plane and entire to slightly serrulate, the operculum is apiculate, and the perichaetial leaves are smooth. *Platygyrium repens* has a blackish-green color with a curious sheen not seen in *Hypnum pallescens,* the leaves are entire, there are nearly always clusters of budlike brood-bodies in the leaf axils, and the capsules are erect. *Pylaisiadelpha tenurirostris* differs from *Hypnum pallescens* in having less falcate-secund leaves, filamentous pseudoparaphyllia, filiform axillary brood-bodies, a small cluster of somewhat enlarged and inflated alar cells, dioicous sexual condition, and erect capsules that lack endostomal cilia.

There are two forms of *H. pallescens* that differ in plant aspect (compact, subjulaceous to soft and loosely arranged), alar cell development, capsule size and orientation, degree of leaf marginal serration, and cell length and width. The two names generally associated with these expressions are *H. pallescens* and *H. reptile*. Ando (1973) and Crum & Anderson (1981) give detailed discussions on the applications of these names and their morphological variations. The two expressions are connected by "... transitional forms making it impossible to distinguish two taxa" (Crum & Anderson 1981). Most Maine material of the species belongs to the "soft form".

9. *Hypnum plicatulum* (Lindb.) Jaeg., Ber. Thätigk. St. Gallischen. Naturwiss. Ges. 1877-78: 316. 1880.*Stereodon plicatulus* Lindb., Acta Soc. Sci. Fenn. 10: 254. 1872.

Plants small, pale, yellowish-green in dense mats. Stems prostrate, creeping, regularly pinnate; in cross-section hylodermis present, central strand present. Pseudoparaphyllia narrowly foliose to deltoid. Leaves in two curving rows, more or less complanate. Stem leaves 1--1.5 mm long, falcate-secund, oblong-triangular to ovate-lanceolate, concave, auriculate or rounded at base, decurrent, smooth, apex long and slenderly acuminate, margins serrulate above, plane to somewhat narrowly recurved below; costa short and double; median cells linear-flexuose, 50--70 mm x 3--5 mm, firm-walled, basal cells shorter, incrassate and usually porose near insertion, alar cells 5--8, irregularly triangular, quadrate, or shortly rectangular, incrassate, usually displaced inward by the basal auriculation. Branch leaves smaller, narrower, with weakly differentiated alar cells. Phyllodioicous. Inner perichaetial leaves long-lanceolate, long-acuminate, 3.0 mm long, smooth to weakly plicate below, lightly serrulate above. Setae reddish-brown, 18--25 mm long. Capsules curved to arcuate, 2--2.5 mm long, cylindrical, lightly plicate at base when dry; operculum conic. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish,

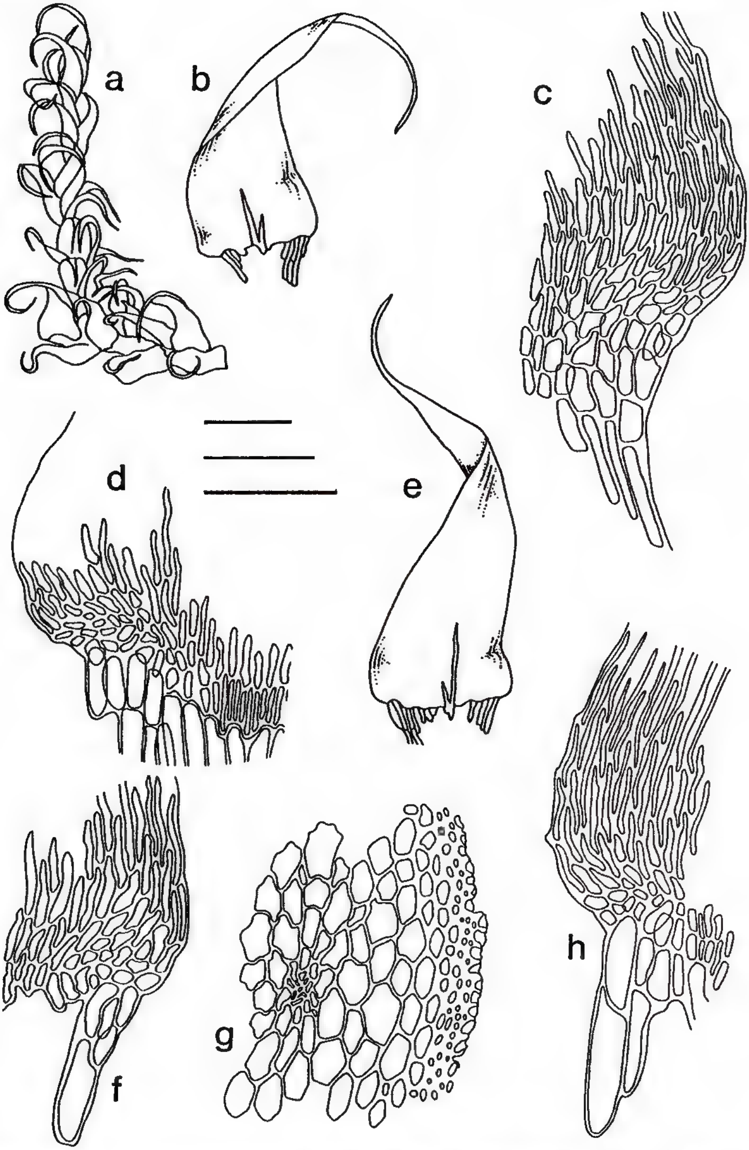

Figure 9. *Hypnum plicatulum*. a. Habit. b. & e. Stem leaves. c., d., f., & h. Leaf bases. g. Stem cross-section. Scales in mm: Top = 0.05 (c, d, f--h); middle = 1.17 (a); bottom = 0.5 (b, e).

lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia 2--3, well developed, nodose. Spores spherical lightly roughened, 10--12 mm. Calyptra not seen.

On humus over rocks and stones in woods and along streams, also on bark at the base of trees. In Maine known from Aroostook (*Riddle* NY), Franklin (*Pursell 11135* MO), Hancock (*Davis* MAINE, MO), Oxford (*Bacon 27* NY), Sagadahoc (*Allen 16610* MO), and Washington (*Harvey* NY) counties.

*Hypnum plicatulum* is a small *Hypnum* with a field-aspect much like *Ctenidium*. It is one of three species (*H. plicatulum*, *H. hamulosum* and *H. callichroum*) of section *Hamulosa* in eastern North America, which is characterized by small to medium sized, autoicous, dioicous or phyllodioicous plants that have a well developed stem hyalodermis and plicate perichaetial leaves. *Hypnum hamulosum* differs from *H. plicatulum* in its non-auriculate stem leaves, while *H. callichroum* differs in having numerous, thin-walled and enlarged alar cells.

*Hypnum curvifolium* Hedw. and *H. fertile* also can be confused with *H. plicatulum*. Although both *H. curvifolium* and *H. plicatulum* have auriculate leaves, *H. curvifolium* lacks a stem hyalodermis and its leaves end in a short, broad acumen. The separation of *H. fertile* from *H. plicatulum* is more difficult and depends upon a careful examination of three features: stem leaf shape at base, stem leaf alar cell development, and sexuality. In *H. plicatulum* most stem leaves are auriculate at base, however, they also can be rounded to the insertion and often leaves stripped from single stems have both types of leaves. In contrast the stem leaves of *H. fertile* can be rounded or straight to the insertion, with both types of leaves occurring on single stems. The alar cells of *H. plicatulum* generally consist of a few small, thick-walled subquadrate to rectangular cells that are positioned away from the leaf margin due to the leaf base auriculation. When the leaves are rounded to the insertion the alar cells are not displaced, and occur along the basal margin. Often there are a few enlarged, inflated cells at the very base of the leaf, these cells however appear to be stem hyalodermal cells rather than alar cells. In contrast the alar cells of *H. fertile* consist of an excavate group of enlarged, thin-walled, hyaline cells at the base of the leaf above which are a few small, irregularly subquadrate cells along the basal margin.

Plants of *H. fertile* are autoicous with perigonia occurring very near the perichaetia on the same stem, while *H. plicatulum is* phyllodioicous.

Ando (1972) included *H. plicatulum* in his *Hypnum* group with plicate capsules, and his capsule figures (Ando 1995) are indeed strongly furrowed. Material of *H. plicatulum* from both eastern and western North America, however, have capsules variably plicate and often only weakly plicate at base.

10. *Hypnum pratense* Koch *ex* Spruce, London J. Bot. 4: 177. 1845.
*Breidleria pratensis* (Koch *ex* Spruce) Loeske, Stud. Morph. Syst. Laubm. 172. 1910.

Plants large to robust, light-green, yellowish-green to rarely reddish-yellow at base in dense mats. Stems prostrate and creeping, or ascending, sparsely and irregularly branched, rhizoids in abaxial cluster at leaf base; in cross-section hylodermis present, central strand present; axillary hairs with 1 red, quadrate, basal cell and 2-3 hyaline, cylindrical upper cells. Pseudoparaphyllia narrowly foliose. Leaves erect-spreading in two curving rows to complanate. Stem leaves 1.5--2.5 mm long, falcate-secund, oblong-triangular to oblong-lanceolate, concave, rounded to auriculate at insertion, not or weakly decurrent, undulate to lightly rugose when dry, apex acute to broadly acuminate, margins serrulate above, plane; costa short and double; median cells linear-flexuose, 50--90 mm x 2.5-4 mm, firm-walled, basal cells shorter, incrassate and usually porose near insertion, alar cells subquadrate to short-rectangular, firm-walled, a few cells at the inner basal angle somewhat enlarged and thin-walled. Branch leaves smaller, narrower, with weakly differentiated alar cells. Dioicous. Inner perichaetial leaves lanceolate, acuminate, plicate, lightly serrulate above. Setae reddish-brown, (20-)30--40 mm long. Capsules curved and asymmetric, 2--3 mm long, smooth, constricted and wrinkled at neck when dry; operculum conic-apiculate, 0.5-1 mm long; annulus clinging to the capsule mouth or falling with operculum at dehiscence. Peristome double, exostome teeth subulate-acuminate, yellowish-brown, cross-striolate below, hyaline and papillose above, trabeculae projecting at back; endostome yellowish-hyaline, lightly papillose, basal membrane high, segments keeled, narrowly perforate, cilia 2--3, nodose. Spores

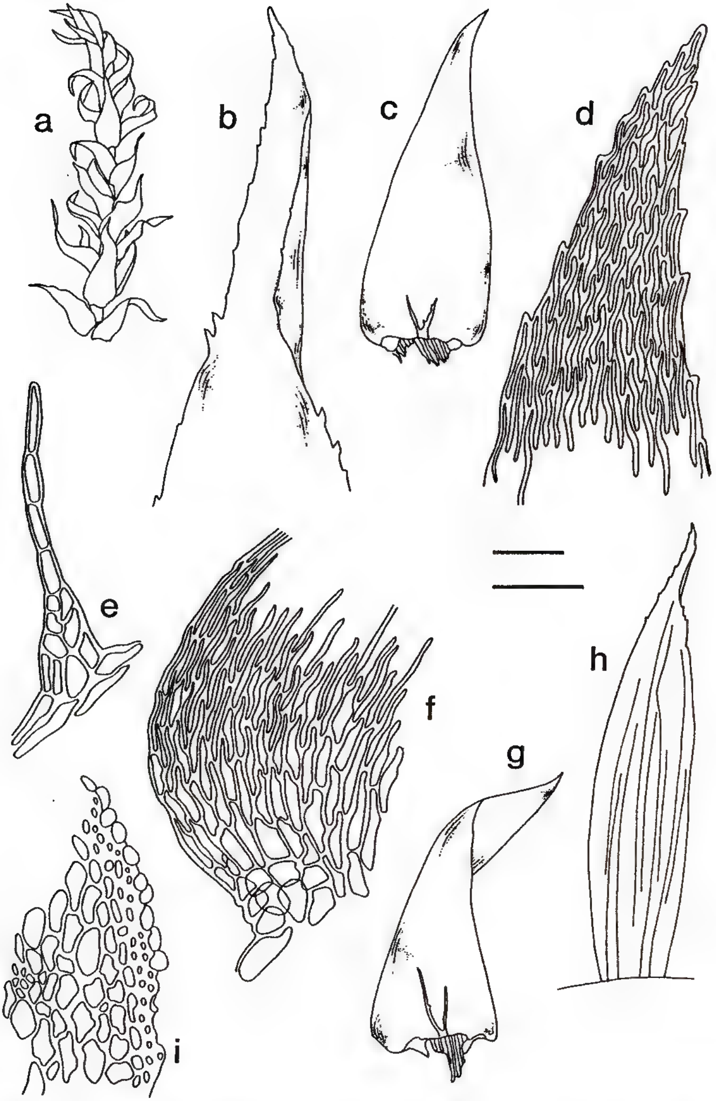

Figure 10. *Hypnum pratense*. a. Habit. b. Perichaetial leaf apex. c. & g. Stem leaves. d. Leaf apex. e. Paraphyllium. f. Leaf base. h. Perichaetial leaf. i. Stem cross-section. Scales in mm: Top = 2 (a); bottom = 0.05 (d, e, f, i); bottom = 0.1 (b); bottom = 0.5 (c, g, h).

spherical, lightly roughened, 10--14 mm. Calyptra not seen.

On humus in wet or seepy areas. In Maine known from Aroostook (*Lowe* MAINE, MO), Hancock (*Lowe* MAINE, MO); Oxford (*Adams* [Grout, North American Musci Perfecti 349] MO), and Somerset (*Allen 9319)* counties. Reported from Penobscot county (Parlin 1939). A report of the species from Kennebec county (Allen 1993) is based on a collection of *H. lindbergii.*

*Hypnum pratense* is a robust species with a field aspect very similar to *H. lindbergii.* Both species are found in wet habitats, and have sparsely to irregularly branched stems with a well developed hyalodermis. Its leaves are weakly undulating when dry and it differs from *H. lindbergii* in having auriculate to rounded leaf bases with only a few somewhat enlarged and thin-walled cells in the lower basal angle. In addition, the capsules of *H. pratense* are smooth when dry (constricted and wrinkled at neck), the pseudoparaphyllia are narrowly foliose, the cilia are nodose throughout, and the axillary hairs have a red basal cell with the upper cells hyaline. In contrast, *H. lindbergii* has furrowed capsules when dry, broadly foliose pseudoparaphyllia, cilia appendiculate at apex, and axillary hairs that are hyaline at base but reddish-brown above.

*Hypnum curvifolium* can be confused with *H. pratense* since both species have leaves that are rounded to auriculate at base, however that species lacks a stem hyalodermis, is regularly pinnate and its leaves are more strongly serrulate. The only other Maine species of *Hypnum* with a stem hyalodermis, *H. plicatulum* and *H. hamulosum* are found in mesic habitats, are considerably smaller than *H. pratense,* regularly pinnately branched, and have slenderly acuminate leaves.

**Acknowlegments**. I thank the University of Maine (MAINE) and the New York Botanical Garden (NY) for the loan of their Maine *Hypnum* collections.

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# New State Records for Nevada and Idaho

P. M. Eckel[1]

While processing a few collections of bryophytes made on a recent trip through Nevada and Idaho, I discovered the following taxa to be of note. Specimens are deposited at BUF, the numbers are my own.

*Bryum amblyodon* C. Muell. NEVADA: Elko Co. S of Interstate 95, Rte. 582 to Angel Lake, roadside ravine, soil between boulders, seasonal stream, 7400 ft., no. 9506211, June 21, 1995.

A species of alpine tundra, frequently associated with glaciers in the western mountains, this station appears to be somewhat anomalous. Presumably this is a collection from the margin of a population more commonly occurring toward the top of the mountain in which Angel Lake occurs, and which was heavily covered with snow at the time the collection was made and hidden in dense fog throughout the morning hours.

*Didymodon vinealis* var. *brachyphyllus* (Sull. in Whipple & Ives) Zand. IDAHO: Cassia Co. on US 93, N facing basalt outcrop, *Artemisia* & grasses, mile 14 near Raft River, arid grassland between mountains, Snake River Plain, no. 9508281, July 5, 1995.

The amplitude of distribution for this plant was enlarged in a recent publication by Zander, Stark and Marrs-Smith (1995). It is apparently widespread in the west as indicated by Lawton (1971) and Zander (1981). It probably occurs extensively along the basalt outcrops throughout the Snake River Basin and are readily at hand in Idaho on roadside stations along US Route 93, for example. Common species with which it is associated are *Bryum argenteum* Hedw., *Bryum caespiticium* Hedw., *Encalypta rhapdocarpa* Schwaegr., and occasionally *Tortula caninervis* (Mitt.) Broth. and *Tortula ruralis* ((Hedw.) Gaertn., Meyer & Scherb..

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[1] Buffalo Museum of Science, Buffalo, NY 14211

For the sake of a kind of clerical completeness, the following species is noted for Idaho since its occurrence is not obvious from the state list published by McCleary and Green (1971). It is not mentioned in a note on the Idaho flora by Christy and Johnson (1987), however it is noted separately in the general works of Lawton (1971) and Flowers (1973) and is probably common at least in the southern portion of the state:

*Tortula caninervis* (Mitt.) Broth. IDAHO: Twin Falls Co., on US 93, 22 miles N of border with Nevada, open grassland, basin between low hills, Sage shrubs, rodside swale, seasonally dry, with *Pterygoneuron ovatum*, no. 9508286 July 5, 1995.

I would like to thank John Spence for identifying the *Bryum* from Nevada, and for Richard Zander for verifying the *Didymodon*.

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# *Aspicilia moenium* in the Western Hemisphere

W. A. Weber[1]

On September 8, 1988, Einar Timdal and I were walking down a short zig-zag trail that leads from the University of Colorado campus down to Boulder Creek. The trail is dilapidated, but a crumbling rock revetment prevents the slope from caving in over the walkway. Suddenly he stopped, and with his penknife he extracted a few bits of mortar and exclaimed, "This is my *Aspicilia excavata*, which Göran Thor and I described in 1986 from Norway. This will be the first from America!" I am afraid that the specimen looked too puny for me a to get a clear idea of its salient characters, but relying on his determination I reported it (Weber 1990). In 1992, Thor & Timdal (1992) found an earlier name for it in *Endocarpon*, so the *Aspicilia* became *A. moenium* (Vainio) Thor & Timdal. The species remains little known, from Finland, Norway, Sweden, and Austria.

Recently, while preparing a self-guided tour of the lichens of the University of Colorado campus, I decided to list the lichens on a retaining wall running north from the northeast corner of Clare Small Building, which houses the COLO herbarium. The buttress at its maximum height is about twelve feet tall, and narrows down at a 45 degree angle to zero. An iron railing is cemented along the top. This wall was built at the same time as the building itself, in 1928, in order to prevent washing of soil from the sides of the new building. A maximum of 68 years has elapsed for lichens to have reached their present development. Lichens occupy a zone beginning with the horizontal surface of the buttress, down the west side in a band about 1-2 feet wide. Below this point the surface has been sandblasted to remove graffiti. The upper surface is dominated by *Xanthoria elegans*. On the vertical surface, in decreasing proportions there are specimens of *Aspicilia cf. desertorum*, *A. cf. calcarea* (totally pruinose), *Caloplaca citrina*, *C. saxicola*, *Candelariella rosulans*, *Acarospora cf. smaragdula*, both naked and pruinose forms, *Lecanora garovaglii*, *L. muralis*, and *L. dispersa*.

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As I analyzed this community I discovered an extremely minute lichen that was quite unfamiliar to me and unique in its appearance. It consisted of separate squamules only 0.3-0.5 mm high and wide, resembling very truncated tubes, like extremely short gray smokestacks tilted to one side, with an ascending upper lip exposing a coal black underside (dark soredia). It occurred to me that this might very well be a colony of *Aspicilia moenium* in extremely good condition, much better than the eroded-looking, oxalated whitish fragments that I had seen earlier. Referring back to the photograph and description in the original paper, I found that my hunch was correct.

A discovery of this sort on a part of a University building raises ethical problems. How to obtain a voucher specimen of this wonderful find on a buttress that bears no visible scars up to the present time? To judge from other cited specimens, the preferred habitat has been on mortar of old Christian churches. Fortunately, in this instance I have had the cooperation of the staff of our Facilities Management Department, who extracted a nine centimeter diameter core. The lichen, as in most collections, is sterile.

My main reason for publishing this note is to alert lichenologists in North America to the likelihood that this species is neither rare nor restricted in its distribution, but probably has subtle ecological requirements of exposure, light, and moisture. At the present time, the Boulder, Colorado campus is its only known Western Hemisphere station. If one could duplicate exactly the conditions in which the Boulder population occurs (either on smooth concrete or hand-applied chinking between granite boulders), *Aspicilia moenium* might prove to have a wide or uninterrupted range across North America. Its apparent restriction to mortar raises the question of its origin here. From where might it have arrived, and by what means? Is there any known occurrence of the lichen on a natural substrate?

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